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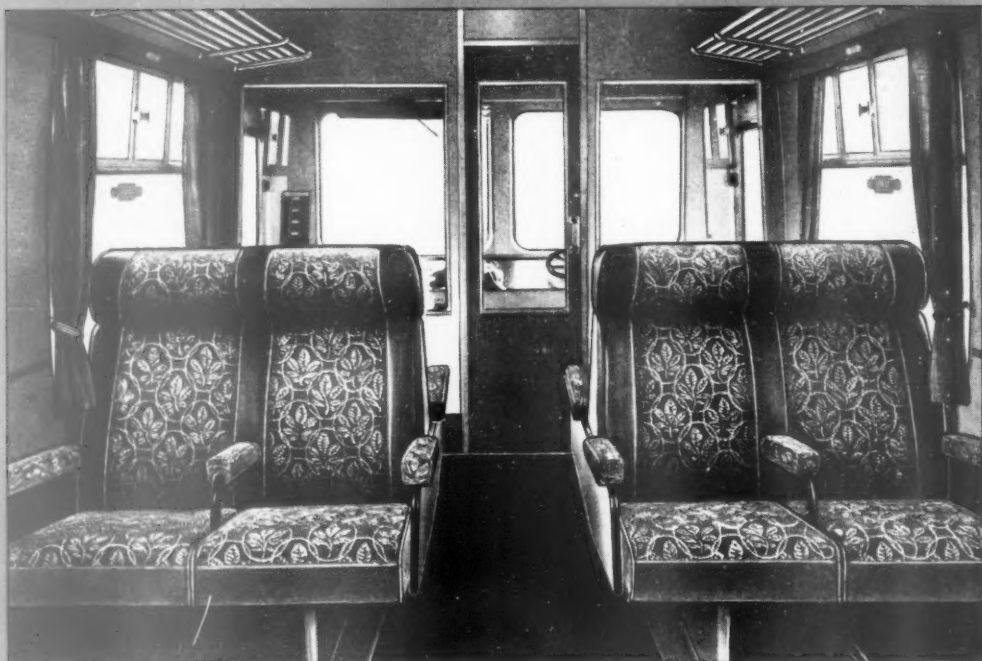
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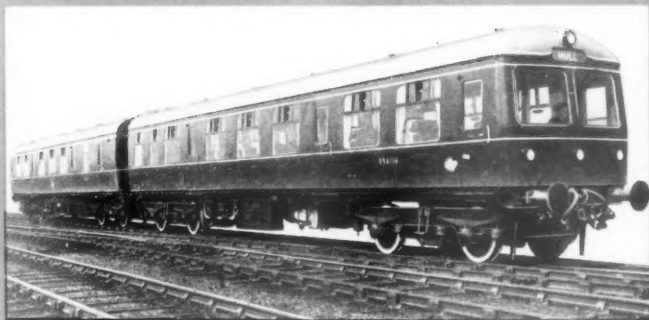
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### Further Wage Increases

THIS week has seen much critical activity in connection with wage demands and by Wednesday decisions had been announced which must have important consequences for the railways in the months to come. On Monday, the London Transport Executive increased its previous offer to London busmen of some 3 per cent to 7s. 6d. for drivers and 7s. 4d. for maintenance staff, with additional payments amounting to 1s. 6d. a week for Saturday afternoon work. The effect is to give an average increase of between 4 and 5 per cent. This offer was accepted by a delegate conference of busmen on Tuesday, and is to be retrospective for 10 weeks. Some 53,000 London Transport staff are affected and the cost to the Executive is likely to be £1,500,000 in a full year. The decision was bound to affect the attitude of the delegate conference of members of the Associated Society of Locomotive Engineers & Firemen, which was meeting as we went to press to consider whether the 3 per cent pay increase, against a 15 per cent demand, awarded by the Railway Staff National Tribunal in December, and already accepted by the British Transport Commission, should be accepted by the union. Delegates to the London district council of the National Union of Railwaymen on Tuesday night called on its national executive council to "stand firm" on the union's demand for a 10 per cent wage increase. The N.U.R. recently rejected an offer by the Commission

of a 3 per cent increase in line with that awarded to the A.S.L.E.F. The prospect of a rise in the official retail price index, partly as a result of the Suez crisis, is likely to make the railway trade unions even less willing to accept the offers made by the Commission. Yesterday, the claim of the Transport Salaried Staffs' Association, which, before the emergency, had been reluctant to ask for a pay increase, was to be heard by the Commission. The call for a two-day strike of all engineering and shipbuilding employees made by the Amalgamated Engineering Union on Tuesday in support of the engineers' rejected claim for a 10 per cent increase indicates an attitude which may have far-reaching results.

### Retirement of Mr. Edgar Hunt

MR. EDGAR HUNT, who retired at the end of last year from the position of Assistant General Manager, London Midland Region, British Railways, is well known for his pleasant and unruffled disposition. No doubt his imperturbability is due in large part to his mastery of his job, for, as an authority on the goods operating side of railways, he has built a high reputation during his 50-odd year career. He also has the advantage of an ingrained knowledge of railway problems since he represents the third of four generations of his family to serve British railways. One hundred and fifty years ago, his grandfather began his career with the former Great Western Railway, and today his son, Mr. S. F. Hunt, is serving as Commercial Assistant in the District Traffic Superintendent's office at Carlisle. Mr. Hunt is a member of one of those railway families, the numbers of which are regrettably decreasing, which have made so important a contribution to transport progress in these islands. Not least among those who will wish him well in his retirement are the members of the L.M.R. (London) Dramatic Society. He is succeeded by Mr. Leslie M. Sayers, Divisional Operating Superintendent, Crewe, since 1954.

### B.T.C. Welcomes Fresh Outlook

THE British Transport Commission already makes considerable use of electronic devices, a typical example being provided by the method of paybill compilation. Wishing to ensure the maximum and most valuable use of the constantly-improving new working medium, the Commission carries out intensive study on electronic development and adaptation for the improvement of communications, the better recording of wagon movement, in marshalling yards, and towards greater efficiency in stores documentation and office procedure of various kinds. In this, a policy is being pursued in agreement with that of other large transport systems throughout the world. To speed the process in Britain, the Commission has now appointed an Electronics Advisory Panel of B.T.C. officers under the direction of Mr. G. H. Hinds, formerly Director of Weapons Research, Ministry of Supply. Besides its work of direct research, the Panel will keep abreast of electronic development elsewhere. The appointment of Mr. Hinds is a further indication of that increasing catholicism now being shown by the Commission towards new appointments and noted in the cases of the recently-formed advisory panel of consulting engineers and the appointment of Mr. Arnold Kentridge, formerly of the Leicester College of Technology & Commerce, to head the new training centre at Watford.

### London Transport Advice

ONCE again, Mr. L. C. Hawkins, Member of the London Transport Executive, has been chosen to lead an advisory mission overseas. It will be remembered that he went to Singapore at the end of 1955 to help solve problems connected with the Colony's public transport, and that the subsequent report of his mission received unusually high praise. His latest task is to make recommendations to the Government of Ceylon on the reorganisation of that island's omnibus services, and the short interval which separates the two missions is a telling

indication of the value placed overseas on L.T.E. knowledge and experience. Problems facing the team include the constitution and establishment of a Public Authority for the new bus services, managerial organisation, and re-planning of routes. Mr. Hawkins will be assisted by two London Transport officers, Mr. H. F. C. Adcock, Divisional Superintendent in the Department of the Operating Manager (Country Buses and Coaches), and Mr. R. G. Hills, Divisional Engineer in the Department of the Chief Mechanical Engineer (Road Services). While in the East, Mr. Hawkins will visit Singapore in connection with the implementation of his first mission's recommendations. With him will be Mr. W. E. G. Hewings, one of London Transport's administrative officers. The party will leave London on January 6 and will be away as a whole for three months—Mr. Adcock, Mr. Hills, and Mr. Hewings will return later.

### Outlook for Steel

STEEL output for 1956 is now known to have been some 20,700,000 tons compared with the estimate of 21,300,000 tons put forward early last year. The deficiency is the result of the maintenance dispute in the industry which lasted from April to August. An article in the January issue of *Steel Review*, the British Iron & Steel Federation quarterly, states that demand in the second half of the year for light and thin products was restricted but there was continued pressure for heavy products, including steel plates, which are of particular interest to railways. In normal circumstances, new plant and technical advances could have been expected to lead in 1957 to an output 1,500,000 tons higher than in 1956 and some 2,500,000 tons higher than in 1955. The uncertainty as to fuel oil supplies makes an assessment of actual output difficult, for the industry is by far the largest user of fuel oil in Britain and oil-fired furnaces produce nearly 8,000,000 tons of steel a year. Oil is also used for some processes even where other fuel, or the Bessemer process, is used for steel production. Other types of liquid fuels, such as tar or creosote-pitch, can be used but their effectiveness as a substitute will depend on the amount available.

### Locomotive and Rolling Stock Production

THE first provisional results of the Census of Production for 1955, published in the *Board of Trade Journal* for December 22, 1956, show that the gross output of railway locomotive shops and locomotive manufacture rose from £70,200,000 in 1951 to £94,100,000 in 1955. The net output rose from £38,500,000 to £53,700,000. The number of operatives fell in the same period from 72,700 to 71,300, but employees other than operatives grew from 10,100 to 12,100. Gross output of railway carriages and wagons, including trams, also expanded considerably—from £99,800,000 in 1951 to £133,200,000 in 1955. The net output rose from £44,400,000 to £54,900,000. The number of operatives, output for output, was rather smaller than in locomotive building, and in 1955 was 75,800, 3,400 less than in 1951. The number of non-operatives also fell, from 9,700 to 9,400. Capital expenditure in the locomotive industry in 1955 on plant, machinery, and vehicles was £1,800,000, and a further £500,000 was spent on new building work. In carriage and wagon manufacturing the corresponding figures were £1,400,000, and £400,000.

### Preliminaries to Electrification

THE Eastern Region of British Railways is intensifying its civil engineering work in readiness for the opening in mid-1960 of electric services from Liverpool Street to Chingford, Hertford East, and Bishops Stortford. Contracts, details of which are given in our Contracts and Tenders section, have been let for the reconstruction of the superstructures of 11 overbridges, five between Hackney Downs and Clapton on the main line serving Bishops Stortford, from which the Chingford and Hertford East branches diverge at Clapton and Broxbourne respectively,

and the remaining six bridges between Hackney Downs and Bruce Grove on the Enfield Town branch, also to be electrified by mid-1960. The work on these bridges will allow sufficient clearance for the overhead distribution equipment to be used. Another contract of interest in the same list is for the reconstruction of the superstructure of two underline bridges between Churchbury and Forty Hill on the Churchbury Loop. This five-mile line, opened in 1891, was closed to passenger traffic in 1909, re-opened in 1915 and closed again in 1919. It runs from Bury Street Junction on the Enfield Town line to Cheshunt, on the Cambridge line, and seems likely to be given a new lease of life by electrification.

### Institute of Transport Annual Report

THE net increase of 105 in the membership of the Institute of Transport, recorded in the report of the Council for the year ended September 30 last, shows that the Institute is continuing its appeal to managements and staff of transport undertakings as the recognised professional body concerned with all forms of transport. Total membership, at October 1, was 9,224. A significant point for the future is that a net loss of 167 students during the previous year has been converted to a net gain of 36 in the year under review. The high rate of turnover of student members continues, however, and to balance 765 student enrolments there was a loss of 541, and 188 students transferred to higher grades of membership. During the year Mr. Peter Masefield, President and Chairman of the Council, visited 14 Sections in the British Isles and Mr. D. M. Robbertze, Chairman of the Southern Africa Division, visited the Institute in London. The Congress at Southport, postponed from the previous year because of the railway strike, was held on June 5-8. Sir Gilmour Jenkins, immediate Past President, deputised for Mr. Masefield at the Congress. A residential course on "The cost of transport" was held at Ashridge during the weekend September 14-17. A Graduate & Student Society was formed in Melbourne and a Discussion Group at Selangor, Malaya.

### Main-Line Diesel Trains in Service

THE inaugural runs over the former North British Railway main line between Edinburgh and Glasgow, last Friday, of the Swindon-built multiple-unit main-line diesel trains described in our issue of August 3, 1956, are referred to briefly on another page. This 47-mile main line of the Scottish Region is particularly suited to this type of stock; the attractiveness of the service will be greatly increased by the inclusion of the refreshment cars in the near future. The new sets do not as yet provide a completely new service between the two cities, but, with existing steam trains, give a frequent fast train service in each direction. Scotland provides plenty of scope for rather similar workings, such as from Glasgow to Perth, Dundee, and Aberdeen by the old Caledonian route; and from Glasgow to Ayr. It will be some time, however, before enough "inter-city" sets are available for allocation to all the services.

### Electrification Progress in Italy

INAUGURATION of electric traction last week over some 92 route-miles from Milan to Verona, to be followed on February 1 by completion of conversion of a further 50 miles from Verona to Padua, to join the electrified line from Bologna to Venice, marks another stage in the Italian State Railways project to electrify their principal lines at 3,000 V. d.c. When the French National Railways introduce electric working in the coming summer between Dôle and the Swiss frontier, electric haulage, at differing voltages, will be possible over the "Simplon-Orient Express" route between Paris and Venice. Conversion in the near future, it is understood, of the 64-mile section between Mestre, near Venice, and Cervignano, en route to Trieste, will afford electric traction over the S.O.E. route throughout from Paris well into Yugoslavia. Electric working also

began last week between Foggia and Bari, on the main line from Bologna along the Adriatic coast to Apulia. The pace of electrification at 3,000 V. continues rapid—only recently we recorded the progress made in Sicily; but so far the management does not seem to have favoured the a.c. system at 50 cycles.

### Grandiose Planning in Russia

**T**HE enormous scale of the U.S.S.R. 1956-60 Five-Year Plan as it concerns the railways is shown in its reported provision for 4,000 miles of new construction and 4,000 miles of doubling. No less than 5,000 miles (track-miles, presumably) are to be electrified, as the first phase in converting 25,000 miles over the next 15 years; this will result in electric traction over the entire 3,200 miles from Moscow to Irkutsk, in Siberia. We have received no particulars of the voltage chosen, though presumably a study has been made of 50-cycle traction. Diesel motive power is to be introduced on some 11,000 miles of line. It is understood that no more steam locomotives are being built. More than 18,000 passenger vehicles with metal bodies are being constructed, as are electric motor coaches capable of speeds of 80 m.p.h., for suburban services around some large cities. In the absence of further details it is possible only to guess how far these goals will be achieved, and to what extent the satellite countries will contribute material.

### Signalling on the Liverpool Overhead

**I**N the editorial article in our December 28 issue on the closing of the Liverpool Overhead Railway, reference was made to the automatic signalling installed by I. A. Timmis for its opening in 1893. Semaphore signals, actuated by Currie's "long-pull" electro-magnets, were controlled by "maker" and "breaker" contacts situated beside the line, themselves operated by striking bars attached to the last vehicles of the trains. The Board of Trade insisted, however, on block telegraph, worked by the station staffs, being used as an additional precaution and this was effected by Sykes's "double-arm bell" instruments, first used on the L.C.D.R. Consumption of current, obtained until 1903 from accumulators, was heavy; eventually the company modified the equipment so that the signals were held at "clear" by pawls discharged by mechanical treadle bars and replaced the original "maker" contacts by short lengths of insulated rail energised by the passage of idle collector shoes, as seen for many years on the Paris Métro. Although this much improved the working, it still left something to be desired and, after two or three mishaps had emphasised its weaknesses, it was decided to change to track circuiting and colour-light signals.

### Towards Freedom in Charging

**T**HE confirmation last week by the Transport Tribunal of the British Transport Commission (Railway Merchandise) Charges Scheme, incorporating the amendments made by the Tribunal after considering evidence given at a public hearing lasting 43 days, is the penultimate stage of a process started when the Commission submitted its draft scheme for approval on March 21, 1955. The last stage will be reached on July 1 next when the scheme will come into force. It authorises the Commission to fix maximum charges for the carriage of most merchandise and to make reasonable charges for the remainder. An interim decision issued by the Tribunal last July gave particulars of alterations to the original scheme. Details of the draft scheme were given in our issue of March 25, 1955, and the amendments were discussed in the August 3, 1956, issue.

The main effect of the scheme will be to enable the railways to quote "commercial" rates in response to inquiries by traders and others. The rates can be fixed according to the nature of the particular consignment and need not be published. There will no longer be any question of

rival road operators, aware of the railway rates which now are available for inspection in the rate-books at stations, quoting consistently less than the railways for any given consignment. The railways will be in the same position as road hauliers, of being able, within the limits of the appropriate maximum charge, to quote such rates as they think will secure the traffic. They will be able to take into account not only the weight, but also the "loadability" of goods in deciding the rates to be charged. An article giving the main points of the new scheme appears on another page.

Now that the date for the introduction of the scheme has been fixed it seems opportune to examine the progress towards freedom of charging made on British Railways in the last few years. It is this increasing freedom, with the corollary of ability to suit railway rates to commercial needs, which, with the modernisation plan, is expected to be largely instrumental in putting the finances of British Railways on the road to recovery.

The present charging system, which continues in force until the new scheme comes into use, is based on the 21-class classification authorised under the Railways Act of 1921, which became operative on January 1, 1928. This classification was intended at the time to make a large number of exceptional rates redundant, but in fact so much opposition was raised by traders that it had to be agreed that, provided they fulfilled certain conditions, the old exceptional rates would be brought forward into the new rate books. The standard charges which came into force in 1921 were, in effect, maximum charges, and the railways found it necessary to carry a great deal of traffic at rates below the maximum if the growing road competition was to be met. Exceptional charges grew in number, but even then the railways were restricted by a proviso in the 1921 Act which made it necessary to obtain the approval of the Railway Rates Tribunal to charges more than 40 per cent below the standard. The often-quoted L.N.E.R. Fletton Brick case, though won by the L.N.E.R., showed that this approval was by no means automatic.

Exceptional rates became so important that in 1939 more than 70 per cent of merchandise receipts, other than coal, came from traffic carried at these rates. The position is probably not greatly dissimilar today. These rates are entered in the rate books and are no doubt examined with interest by road hauliers. It is noteworthy that in the annual report for 1955 the Commission reported that although nearly three years had passed since the 1953 Transport Act became law, it was still "without that greater freedom to charge, and hence to compete, which Parliament intended." The great stumbling block, until the 1953 Act, was the law of undue preference, which made it impossible to differentiate substantially between one trader and another. However, the Road & Rail Traffic Act, 1933, had made it possible for the railways to make such charges for the carriage of any trader's merchandise as might be agreed between the railway and the trader concerned. The approval of the Tribunal was necessary in connection with such charges and any trader who thought that his business might be adversely affected could object. The railways were exempted from the operation of the undue preference clauses insofar as these charges were concerned, but in considering agreed charges the Tribunal had to be convinced that the same object could not be achieved by exceptional rates. By the end of 1938 more than 900 agreed charges were in operation and were responsible for some 8 per cent of the gross merchandise receipts. The Transport Act, 1953, allows this principle of charging to be continued under the title of "Agreed Rates."

The 1947 Transport Act provided for a charges scheme which would apply to all the services provided by the Commission and would incorporate the factor of "loadability" of goods. In fact, this scheme was never produced and the relevant portion of the 1947 Act was repealed by the 1953 Act. The latter laid emphasis on competition and rejection of the proposed charging schedules of the earlier Act in favour of a maximum charges scheme, with British Railways left free to negotiate competitive rates below the maxima. The immediate benefits were



legal rather than commercial, and will remain so until the maximum charges scheme is in operation. Nevertheless the railways were released from the restriction of undue preference, which, though not often involved in the courts in recent years, had been an ever-present deterrent to the granting of rates on the purely commercial merits of given cases. It had always been necessary for an objector to prove that preference was not merely preference but also undue preference, before redress could be obtained under this head, but another restriction, also removed by the 1953 Act, provided that all tolls, rates, and charges should be charged equally to all persons in respect of all goods of the same description passing only over the same portion of the line in the same circumstances. This more limited restriction had had also to be borne in mind in the fixing of charges.

It has been mentioned that the Act allows agreed charges to be continued, but it also releases the railways from the need to refer such charges to the Transport Tribunal. It goes even further and permits the railways to conclude agreements with traders in any terms they think fit for the carriage of any particular traffic. In a paper read to the British Railways (Western Region) London Lecture & Debating Society in January, 1954, Mr. H. D. Poole, Assistant to Commercial Superintendent (Rates & Charges) Western Region, pointed out that since May, 1953, the railways had taken advantage of this by "negotiating a number of simple or contractual agreements without the recourse to the exceptional rates procedure under the Railways Act, 1921." It had not been necessary, he pointed out, to record these rates in the rate books for public inspection, neither had they had to secure the assent of the Transport Tribunal in cases where the rates were more than 40 per cent below the standard charge. The conditions can be framed to suit the particular case and need not be so worded as to be suitable for inclusion in a rate book. In an article on page 367 of our issue of September 28 we suggested that certain methods of agreed charging as practised in Canada could not be applied in this country at present. We had the delay in application of the new maximum charges scheme in mind, but it has been pointed out to us that, in fact, similar charges can be, and are being, made under the procedure outlined above. Indeed, Mr. David Blee, now General Manager, London, Midland Region, in his then capacity as Chief of Commercial Services, British Transport Commission, giving evidence before the Royal Commission on Agreed Charges in Canada in 1954 as a witness in support of the agreed charge system of competitive rate making, said that the 1953 Act allowed British Railways to make agreed charges and other agreement rates as a private matter between the parties and subject neither to the approval of any court nor to publication.

Certain restrictions repealed by the 1953 Act will remain in force until the maximum charges scheme become operative. These include the publication of those rates entered in the rate books, so that road hauliers can still ascertain railway rates although their own are not published and not known to the railways. The only railway rates to be published by law when traffic is carried under maximum charges will be the maximum charges. The scheme will also make it possible to increase rates without reference to the Minister of Transport providing that they remain below the maximum charges. Should an increase beyond the maximum laid down be required, the Commission may give notice that its charges are to be increased by a given date (subject to a maximum increase of 10 per cent above maximum charges). The Commission must then, within one month, unless the Minister allows otherwise, submit its case to the Transport Tribunal. The increase asked for then need not be the same as that stated in the notice.

Although traders are, in general, debarred from complaining to the Transport Tribunal about exceptional rates and agreed charges, a measure of protection remains for traders who cannot reasonably send their traffic by any means of transport other than rail and feel that they are being charged unreasonable or unfair rates. Traders in this category may put their case to the Tribunal and the Commission must then be able to satisfy the Tribunal

that the charges concerned are in fact fair and reasonable. Other factors, which affect the relationship between the railways and coastwise shipping, harbour authorities, and canals and canal carriers are little changed although there are some extensions of application.

It is clear that the amount of traffic to be dealt with under maximum charges provisions will not be as great as the Commission probably would like, and the concept of "reasonable" charges for some classes of traffic is a ground for future argument. A large part of the ordinary merchandise carried, however, will be under one of the two main sets of scales set out by the Tribunal, and within this framework the railways will have much of the freedom of action which they have so long sought.

## Bank Loans for Railway Development

**I**N recent years aid on an increasing scale has been given by international agencies to assist in the development of transport, more particularly in the under-developed countries. Technical assistance through fact-finding missions has been made available by the United Nations, loans by the International Bank, and within the Commonwealth and Colonies under the Colombo Plan and by the Colonial Development Corporation. Nearer home the Conference of Transport Ministers in association with the O.E.E.C. and the Council of Europe has been active in promoting the co-ordination of transport and standardisation of equipment in Europe.

The extent of such aid has been brought out by the recently issued report for the year ended June 30, 1956, of the International Bank for Reconstruction & Development. In the last years improvement in transport services, railways, roads, and ports have occupied an increasingly important place in the Bank's lending. Assistance ranges from preliminary surveys by technical missions to the provision of specialists, preparation of the plans for the projects, and their final financing by loans on all five continents. Of the \$127 million lent for this purpose last year \$43 million, or over one third, was for railways in three countries, South Africa, Thailand and Burma. "Overseas Railways" for 1956 contains accounts of the work done in all three countries in the way of rehabilitation and re-equipment and of the programmes for the next few years. In South Africa the expansion programme was started in 1947, and two previous International Bank loans, totalling \$50 million, helped to finance its earlier phases. The proceeds of last year's loan and of a private bond issue are being applied to expenditures on the programme for the three years from April, 1955, to March, 1958. During this period the administration is making extensive improvements of the permanent way and is purchasing additional locomotives and passenger and goods vehicles to increase the carrying capacity of the railways. Total capital expenditure during the three-year period will be equivalent to over \$500 million, of which more than one fourth will be spent overseas.

As recorded in "Overseas Railways," in May last year the Burma Railway Administration negotiated a loan with the Bank for \$5,350,000. In its report the Bank points out that the main needs now are for additional wagons to deal with the growing traffic on the Burma State Railways, new passenger coaches to replace obsolete and damaged stock, heavier rails, and reconstruction or further repair of a number of damaged bridges. All are provided for under the programme to be carried out during the four years 1955-59. The total cost is estimated at \$35 million, the Bank loan being mainly devoted to pay for imported wagons, diesel railcars, and bridge reconstruction materials.

The Siam railway loan is for \$12 million. As, in that country, the railways, which radiate from Bangkok, the capital city and principal seaport, are the only means of transport that link all important regions of the country and also facilitate transit trade to Cambodia and Laos, their maintenance at a high level of efficiency is vital to economic development. The five-year programme, to the

carrying out of which the loan is to be used, includes both the rehabilitation of physical properties and the improvement of the railway operations and administration. It provides for the renewal of 875 miles of track, the purchase of diesel locomotives, passenger coaches, and freight vehicles, and for fitting of automatic couplings and the installation of a modern telecommunications system.

Railway transport also benefits indirectly from many of the other activities of the Bank. For instance the Volta River project in the Gold Coast, which is an integrated scheme for producing aluminium, includes a port and railway project. The Bank has been generous in technical advice here. The Bank loan of some \$75 million to India for iron and steel production is aimed at meeting the increased demands for steel from the railways, among other consumers. The assistance given to the Persian Plan Organisation has included specialists in transport.

It is understandable that in the younger countries, more particularly in South and Central America, it is road rather than railway building that has received most aid. In such countries lack of good transport facilities has been a chief obstacle to economic development. An instance is Colombia, which received its third loan for road construction last year. In fact, since the Bank began its activities over \$650,000,000 has been advanced to such Western Hemisphere countries, no less than \$75 million being advanced last year. A large part has gone to building roads, and ports and electric power have also been receiving a considerable share. The Bank has stated its belief that it can contribute most effectively to economic growth in less developed countries by first assisting in the establishment, equipment and training of efficient road maintenance services, rather than by financing new construction. In the past, it points out, some countries have spent large sums on new roads but allowed them to become unusable through inadequate maintenance.

This applies to a lesser extent to railways, modernisation and re-equipment of which is equally important if they are to make their particular contribution to the economy of a nation. Fortunately the Bank is fully alive to this also, as is shown from its fine record of assistance given during recent years towards the modernisation and re-equipment of railway systems in a very large number of countries in varying stages of development.

### Using Railway Capacity

**D**ESPITE the efforts made by British Railways to advertise their ability and readiness to accept and carry freight which road hauliers, because of fuel shortages, were expected to be obliged to refuse, the amount of traffic actually transferred, at the time we went to press, was small. The British Transport Commission estimated earlier this week that the increase in general traffic had been little more than 2 per cent, and for coal traffic some 4 per cent. As the spare capacity on scheduled freight trains on main trunk routes has been estimated, on average, to be some 20 per cent, this response is disappointing. Some classes of traffic, however, more particularly long-distance bulk traffics such as oil in tank wagons, beer, sugar, and certain agricultural necessities, have shown important increases; and the special services recently introduced for export traffic are being well patronised and are undoubtedly carrying some traffic which previously would have gone by road. The railways have a good supply of wagons now that the Christmas and New Year traffic flow has ceased and special freight trains are being run at weekends to clear traffic quickly. The available services are not yet being fully used, though British Road Services are setting an example by using British Railways for the trunk haulage of their traffic on some routes, as for example, between London and Manchester.

It seems clear, in view of the strong complaints of road hauliers about the working of the fuel rationing system and delays in the issue of supplementary rations, that road transport will fall away sharply in the near future. It is probably being maintained at its present level only by using stocks of fuel in hand and by the premature use of

basic rations in the hope that supplementary fuel will be forthcoming. For the railways, this means the possibility of a sudden surge of traffic for which proper preparation, by discussion with traders as to the best means of meeting their requirements, will have been impossible. The situation may well be aggravated by the onset of severe winter weather. In such circumstances the railways will be hard put to it to deal with the traffic, at least at first. Some difficulties which deter traders from using rail transport, such as the need for improved packing for some types of goods where transhipment is involved, must be solved before traffic starts to flow if there is to be satisfaction on both sides; though none of these seems insuperable. It is to be hoped that traders will pay heed to the urging of the Government and start consigning by rail without delay.

The amount of passenger traffic transferred from the roads has been difficult to assess, and has been disguised to some extent by the heavy Christmas carryings. An examination made on December 18, the second day of petrol rationing, showed that suburban railway services into London were carrying 10-15 per cent more passengers and there seems no reason to think that that figure has changed to any great extent. An influx of passengers, however, presents fewer problems than a sudden flow of new traffic demanding special facilities. The great opportunity for the railways still lies ahead, but must now be very close.

### Signalling in Denmark

**O**PERATION of the 1,600 route-miles of State owned railways in Denmark is complicated by the necessity, once even more burdensome than now, of resorting to train ferry services to effect in some cases satisfactory internal communications and in others to enable through vehicles to run to neighbouring countries. On many sections traffic is not very heavy, and comparatively simple operating methods suffice; but on others more complete signalling arrangements are essential. As in many other parts of the world, the rapidly changing conditions of today are making it imperative to use every means of reducing costs without lowering—and even raising—the quality of the train services. In this endeavour the adoption of signalling principles and items of equipment that have proved their worth elsewhere is playing an increasing part, as was shown in the paper read recently before the Institution of Railway Signal Engineers by Mr. James Steffensen and Mr. W. Wessel Hansen.

The mechanical signalling originally used followed in all essentials, as might be expected, the practice obtaining across the frontier in Germany, though the signal aspects showed some differences and bore traces of English influence, both stop and distant signals coming to have semaphore arms. The yellow light, it is of interest to note, was adopted for the distant signal many years ago. The equipment came at first from well-known German firms, such as the Bruchsal Works, but later also from a Swedish undertaking, and the double-wire system of transmission became standard for both points and signals, with trailable points and forms of point locking common in Central Europe. A certain amount of a.c. magneto interlocking block working was used, but a considerable route mileage was operated by telegraphic, or later telephonic, messages. It is now proposed to extend the application of interlocking block with the aid of modern circuit arrangements, the original system not being considered suitable today, when risk of interference from neighbouring power supplies has to be reckoned with. The apparatus, of whatever type, was invariably well constructed and cared for and a high level of safety was obtained with it.

Early in the present century some electric power working made its appearance and in course of time a number of installations, using varying forms of equipment, were put into service, again following methods familiar in that part of Europe, and with the introduction of electric traction in the Copenhagen district automatic signalling, eventually using colour-light signals, now seen in all new work, became increasingly applied. The old signal aspects which



at many small stations used a combination similar to the outer-warner arrangement so well known in India, provided for route indication where thought necessary, but with colour-light signals the ruling principle is to indicate the permissible speed, for which purpose illuminated conventional signs of simple shape are shown in conjunction with the ordinary signal aspects. These latter, from the fact that the coloured lights can be shown diagonally as well as vertically, are able to indicate, where a diverging route is to be taken, in which direction this leads, to the right or left. A calling-on aspect is, of course, also provided for.

In power interlocking the tendency is to develop the all-relay principle and substitute the desk panel for the lever frame, taking over, however, the essential elements of the controlling and detecting circuits that have proved satisfactory with the latter and retaining individual operation in preference to route setting, the prevailing conditions being held not to justify the additional apparatus involved. A good deal of shunting still is effected with the aid of point indicators, an additional reason for this policy. The actual apparatus exhibits to a marked degree the trends that have shown themselves in several parts of the continent of recent years, particularly in relay design, and has had much thought and engineering skill devoted to its production. Remote control over a number of stations along a route, combined with modern describing and train recording mechanism, also is being applied and will doubtless find an increasing field of usefulness, as changing traffic conditions at many places are rendering existing methods of operation increasingly uneconomic. Much interest attaches also to the attempts being made to work very long single track circuit sections.

### Inland Transport in Northern Ireland

**T**HE future of the railways in Northern Ireland has long been a matter of controversy, which is well known. An original approach to the subject has been recently provided by Mr. J. C. Bailie, Traffic Manager, Great Northern Railway Board, in his paper read last month to the Belfast branch of the Statistical & Social Inquiry Society of Ireland.

Because of the topography and restricted area of the province, Mr. Bailie dismisses canals and air transport as relatively unimportant and proposes that road and rail services should be grouped together as being interdependent. As far back as 1927, he points out, the railways in Northern Ireland secured powers to operate their own road passenger services, which they did, both as feeders to the railways and also on routes not directly rail-served, where there was obvious need for a public conveyance. He admits that railway transport is comparatively inflexible through its inability to provide a door-to-door service, which accounts for his opinion that only road and rail together provide an inland transport service wholly sufficient for the needs of Northern Ireland.

Contrary to the widely held belief that the railways in the province now carried far less traffic than before the war, he explains that the number of passengers carried by the G.N.R. in 1955, 5,085,335, compared with the 1938 total of 5,005,581, the last complete prewar year, shows an increase of 1.6 per cent; as to freight, the total tonnage carried last year shows an increase of 63.7 per cent (from 779,381 to 1,224,930 tons), and this with a decreased route mileage of 41½, a reduction of some 7 per cent. From these figures he deduces that the G.N.R. is carrying no less business than before the war and yet is apparently being judged solely by its adverse financial operating results in recent years. Despite this increase in the volume of traffic, expenditure has outpaced revenue, in 1938-1955, by some 50 per cent. Mr. Bailie believes that as the levels of charges are as high as the traffic will bear, and cannot be lowered to attempt to attract more customers, the Board must find ways of reducing costs. The only answer is complete modernisation in operational methods, which would reduce expenditure, attract increased public patron-

age through improved services, and increased efficiency of utilisation of manpower and equipment.

Although regretting the working losses which the G.N.R. incurs, he observes that the situation is not exceptional or unusual; few railways are operating at a profit at present. He contrasts the annual net receipts of the Belgian National and the Netherlands State Railways with the losses of the Great Northern Railway Board, British Transport Commission, German Federal, and Italian State Railways.

The step which most railways have to some extent taken, of closing down certain lines, cannot be carried on indefinitely, as, obviously, some traffic is diverted from the lines which remain open. This is the position in which the G.N.R. finds itself in the matter of its secondary lines in Armagh, Tyrone, and Fermanagh, closure of which is desired by the Government of Northern Ireland, and opposed by a number of interests in the Republic, on the ground that if the lines adjoining the Border are closed in Northern Ireland territory, this will be to the detriment of the agricultural and other communities in the Republic, which depend on these lines as a means of transport both between the two territories and between places in the Republic, in so far (over lines built long before Partition) transit through Northern Ireland territory is sometimes necessary.

The economical nature of railway transport as regards the utilisation of national resources is shown in the comparison of traffic movement potentialities of various units operated by the G.N.R. One gallon of diesel fuel, Mr. Bailie has calculated, yields: (a) in a single-deck omnibus, 400 passenger-miles; (b) in a double-deck omnibus, 500 passenger-miles; (c) in a suburban-type multiple-unit diesel train, 850 passenger-miles; (d) in a main-line express diesel train, of the type used for the Belfast-Dublin "Enterprise" service, 515 passenger-miles; while with freight traffic the gallon yields: (e) in a 5-ton lorry, 77.5 ton-miles; (f) in a 15-ton lorry, 150 ton-miles; and (g) in a diesel locomotive hauling a 240 ton payload, 360 ton-miles. This factor of economy is of special importance during the present oil fuel shortage; but it should surely be considered seriously by the Government of Northern Ireland even after, as is hoped, oil supplies return to normal.

Discussing the transport situation in an editorial note in our December 21 issue, we drew attention to the Northern Ireland Government view that because of past heavy losses on railway operation, investment in the railways, and improvements and modernisation, including large-scale conversion to diesel traction, would be an unjustifiable risk of public money. The Government of the Republic does not share this view—so that new equipment is being supplied to Coras Iompair Eireann, and the closing of branches seems to have ceased, at least for the time being. On the other hand, distances, more especially to ports, are shorter in the North, and the economic geography such that the commercial situation of railways is even less favourable than south of the Border.

Clearly it would be unsound and eventually disastrous financially to try to keep alive, by subsidies, the railway system if it had been demonstrated to be redundant—which is certainly not the case. In the light of the figures provided by Mr. Bailie, and in the proven efficiency in the past of the G.N.R., and of the Ulster Transport Authority lines, when given the tools for the job, and of the success of their energetic steps to avail themselves of the benefits of diesel traction—including use of railcars by the G.N.R. to haul vans when required—the experiment of taking every step reasonably possible to enable the railways to equip themselves for really efficient operation, and of allowing some time for watching the success of the experiment, is surely worth trying, before writing off what may yet prove useful assets. The railways that remain in Northern Ireland, if abandoned, can never be re-opened again if it is found that the alternative does not give the community what it needs. The oil shortage has delayed a final decision on their fate. It is to be hoped that the delay will result in constructive steps to increase their efficiency and sphere of usefulness.

## THE SCRAP HEAP

### Proof of Good Workmanship

The Chairman of the Victorian Railways Public Relations & Betterments Board, Mr. H. R. Hauptmann, relates how a thrush, showing good taste, but rather unsound judgment, built her nest under one of the first class reserve cars of the Victorian Railways new suburban electric trains. When discovered, she was happily rearing triplets amongst the undergear.

The problem of saving Mrs. Thrush from the ill-effects of her misguided action was solved when the services were enlisted of a bird lover who, with a minimum of disturbance, removed the nest and fledglings to a good position in the nearest tree. The shift was successful. According to latest reports, all are doing well.

Mr. E. H. Brownbill, Chairman of the Railways Commissioners, has stated: "It just shows how good our new trains are when a mother can almost rear a family in a reserve carriage without fear of it being called into service." The new trains, with motor coach bodies built by the Gloucester Railway Carriage & Wagon Co. Ltd. and electrical equipment by the English Electric Co. Ltd., were described in our issue of December 21, 1956.

### Railway Signals on a Waterway

Railway signals to control the entry of craft into locks on the Weaver Navigation, in the North Western Division of British Transport Waterways, were obtained through the London Midland Region Stores at Euston and were installed at the locks on the Weaver during 1954.

Previously all signals during daylight were given by hand and in time of poor visibility there were occasional complaints; these were overcome by the use of the semaphore arm signals, which give clear signs both by day and by night and direct vessels into one or other of the locks, or if both are occu-

pied, to lay off. The photograph reproduced in the accompanying illustration was taken at Saltersford Locks, near Northwich, Cheshire.

### Steam-Driven Claus

In response to an urgent plea from the villagers of Radcliffe-on-Trent, in Nottinghamshire, British Railways came to the rescue of Father Christmas. He was to have travelled from a near-by Canadian air base in a petrol-driven sleigh, but petrol rationing upset his plans. The villagers, who wanted him to start their festivities by switching on the lights of the Christmas tree in the church hall grounds, appealed to British Railways.

They rose to the occasion. A special compartment was arranged on the Grantham train, prominently labelled "Reserved for Father Christmas."—*"Peterborough"* in *"The Daily Telegraph."*

### Caledonian Class

Having to move a young family on a crowded train one Saturday, I decided that, since cheap day fares were offered, we would all go first class; it was only a short distance anyway. But never again. Let a young and apparently healthy person appear at the ticket office and ask for firsts, and the response he gets will leave its mark on him for ever, as I imagine John Knox must have left his mark on those who heard him on full throttle. "Firsts? Eleven shillings and fourpence?"

When it happened to me, memory stirred and I remembered a solitary previous occasion of like kind; in Newark, New Jersey, of all places. A girl student in front of me at the reservations counter was trying to book a Pullman berth for her return to college. The booking clerk, sweeping aside her protests that it was her mother who was to blame, read her a lecture on pretentiousness: if coach class travel

would do for other students, why was it not good enough for her? I didn't know at the time, but now I realise; his name must have been MacDonald, and his father worked for the old North British.—*From "The Manchester Guardian."*

### Covent Garden Express

Now that coupons will soon be needed for petrol, ingenuity has been hard at work, and high in the list comes the lady who protests that she must have extra as "she cannot use a bus or train because they make her want to sing." But is her diffidence . . . justified?

If she had confessed to an ungovernable urge to talk in trains or buses then indeed her case would be a grave one. . . the Englishman regards his railway carriage as something sacred where privacy must be respected and silence maintained . . . a railway carriage is not the place for conversation. . . Operatic arias are, it is true, full of the most intimate descriptions of personal emotion, but they are only songs, and foreign songs at that, and need not be taken seriously. So long as she sings she cannot speak, and, should she be driven by unsympathetic authority to buy a season ticket, she may find to her surprise that the carriage she chooses, far from being shunned, will soon become the most popular on the train.—*From "The Times."*

### Shenfield—Southend Electrification

(See our issues of December 28 and January 4)

How nice, when we are in the throes Of shortages and fuel woes, To hear good news for those who wend Their way from London to Southend And vice-versa; for the New Year Has brought a modicum of cheer To dwellers by the Essex shore, Whose claims to fame in days of yore Lay in its elongated pier, To ocean-going hikers dear.

By "d.c.'s" \* unseen, artful aid, Lavish arrangements have been made Whereby commuter and tycoon May share the new communal boon Of trains to London by the score— Two for each one that ran before— And celebrate emancipation From older forms of transportation, Pending, of course, that blissful day When atoms have the final say.

Meanwhile, those travelling up and down For their brief interludes in Town May, thanks to all-electric power, Get through the trip within the hour, Occasioning some fretfulness To fans of the old L.T.S.

A. B.



Railway signals to control canal traffic at Saltersford Locks on the Weaver Navigation, British Transport Waterways

\* 1,500 V. d.c., to be altered later to a.c. at 25 kV., 50 cycles

## OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

### SOUTH AFRICA

#### Vacancies for Engineers

Resignations of engineers from the railway service are still a problem despite the greatly improved service conditions granted to engineers in recent years and the urgent attention being given to housing. Recently, while there were no vacancies in the senior grades of any of the engineering departments, over 200 vacancies existed for assistant engineers. The present S.A.R. establishment provides for 787 engineers, of whom 285 are in the senior and 502 in the junior grades.

Many students are now taking engineering courses at South African Universities with assistance from S.A.R. & H. under the bursary plan. It is expected that more will be enrolled in 1957. Railway bursaries will, it is hoped, serve to provide the administration with a reasonable intake of qualified engineers every year and thus help to fill the existing vacancies.

#### High Cost of Passenger Services

The analysed final returns of S.A.R. & H. for the year ending March 31, 1956, show that losses on passenger services, main line as well as suburban, are still a matter for serious concern. The administration, during the year in question, spent £33,985,665 on the provision of passenger services; earnings or revenue amounted to £25,165,421; and there was thus a loss for the year of £8,820,244.

Many services, more particularly those in sparsely populated areas, have to be operated almost in the face of certain loss because without the train, large areas of country would be without regular public transport. Equipment, staff and other resources to provide pas-

senger travel have to be maintained at a capacity to meet peak travel demands during holiday periods, but cannot be advantageously used during off-seasons. Negotiations to stagger holidays and to promote passenger travel during "valley" periods by re-introducing railway excursions are making good progress, and it was hoped recently that a positive plan would be agreed at an early date.

### MALAYA

#### Tractor-Trailers for Port Working

To handle increased traffic at Penang and Port Swettenham, the Malayan Railways are increasing their fleet of Scammell mechanical horse units and automatic-coupling trailers by 50 per cent. At present they have 16 Scarab mechanical horses and 43 trailers working to capacity transporting general merchandise from quayside to the railhead. Orders now placed with Scammell Lorries Limited are for a further seven of these three-wheel tractors and 26 additional trailers.

The Scarab tractors specified are 6-ton models with 52-h.p. engines; the drivers' cabs are of bolted construction for easy erection. The 15-ft. trailers of 6-ton capacity are being supplied without bodies in c.k.d. form.

### NEW SOUTH WALES

#### Sydney-Melbourne Day Service

"Daylight Expresses" between Sydney and Melbourne were inaugurated in March, 1956, on a tri-weekly basis. They have been so successful that since September the service has been operated daily, except Sundays. This is in addition to the two night expresses which

leave Sydney every night of the week. On the N.S.W.G.R. system the daylight service between Sydney and Albury, the break-of-gauge station, has been made possible by reorganising the running of the "Central West Express" from Sydney to Orange and thus providing the additional air-conditioned rolling stock required.

The expresses are hauled by 1,750-h.p. diesel-electric locomotives built by the Clyde Engineering Company.

### RHODESIA

#### Bancroft Branch Opened

The branch serving the Bancroft Mine in Northern Rhodesia was opened to public traffic on January 2. Traffic for the mine had been worked under construction conditions for some months.

The work involved construction of 12 miles of new line and the rehabilitation of seven miles of the old track, between Luano and Old Chingola; the total cost was approximately £400,000. The junction with the Nchanga branch is at Luano, 19½ miles from Bancroft. The only major structure is a five-span bridge over the Kafue.

The line has been built by the Rhodesia Railways on a "guarantee" basis, that is to say, the mining company will, for a period of 10 years, make good to the railways any loss incurred on working the branch. The fares, rates, and other charges are calculated separately to and from the junction siding at Luano.

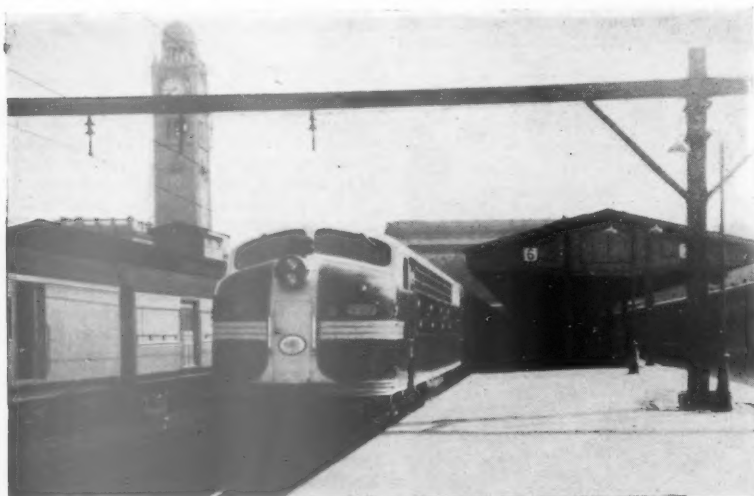
### UNITED STATES

#### Coach Sleeping Cars

The new 13-coach "Denver Zephyr" trains of the Chicago, Burlington & Quincy Railroad, which entered service on October 28, include sleeping accommodation for "coach" or second class passengers, of the duplex roomette type. These provide a new through service between Chicago and Colorado Springs, via Denver. The Chicago, Milwaukee, St. Paul & Pacific and Union Pacific Railroads have also introduced 21-roomette cars for coach passengers on their competing "City of Denver" from October 8, for a trial period of six months, in order to gauge the public demand for such facilities, which are the first of their kind in American history.

#### Continuously Welded Rail

Large-scale experiments are being initiated by the Pennsylvania Railroad to determine whether continuously welded rail is ultimately more economical in laying and maintenance costs than rail with ordinary bolted joints. While a considerable mileage of welded rail is now installed in the U.S.A., this



"Daylight Express" with air-conditioned stock leaving Sydney Central Station, New South Wales Government Railways, for Albury, where passengers change for Melbourne



will be the first time that rail weighing up to 155 lb. per yd. will have been dealt with in this way. Near North East, Maryland, 3 miles of welded 155 lb. rail is being laid in the heavily-trafficked New York-Washington main line; 2 miles of welded 133 lb. rail are being laid at Van Wert, Ohio, on the Pittsburgh-Chicago main line; and 2 miles of 140 lb. rail near Johnstown, Philadelphia. All these are high speed locations. In its large Conway marshalling yard, now under construction, the Pennsylvania will lay a total of 121 miles of welded track.

#### Ban on Cast Iron Wheels

On all American wagons built or rebuilt after January 1, 1958, the use of cast iron wheels will be prohibited. This has been laid down by the Mechanical Division of the Association of American Railroads, as the result of a ballot in which 93 per cent of the owners of railway wagons voted in favour of such a ban. Other changes which have been approved include a ruling that the minimum clearance to rail level from the lowest part of wagon bodies or bogie frames in future shall be 2½ in., in place of the previous 2¼ in.; and that a stencilled "W" shall appear on the outsides of all gondola wagons that have wooden instead of steel floors.

### CANADA

#### More Diesels for C.N.R.

The Canadian National Railways have placed orders for 222 diesel units with a total value of \$44,700,000. When delivery is completed late in 1957, C.N.R. lines east of Montreal and west

of Edmonton will be almost fully converted to diesel traction.

Since the inauguration of the conversion programme, 1,068 passenger, freight, yard, and "work" units have been placed in service. Deliveries early this year will complete a five-year plan of diesel traction on specific runs and services, and the plan of exclusive diesel haulage in certain areas, starting from the East and West coasts, will begin. Ten twin-unit passenger locomotives will be assigned to the "Maritime Express" between Halifax and Montreal, and passenger trains between Halifax and Sidney.

### FRANCE

#### Market in Station Yard

At Remoulins on the secondary line from Lyons (via Le Teil) to Villeneuveles-Avignon, in a fruit-growing area of France, the S.N.C.F. has leased to the municipality an area of approximately 2,750 sq. yd. in the station goods yard as a site for a weekly wholesale fruit market during the fruit-marketing season. The market has been provided with a display and sales room, telephone facilities, and good road access.

As a result, it is estimated that, whereas in earlier years the S.N.C.F. conveyed by rail 40 per cent of the fruit handled at the market, during the 1956 season 60 per cent was sent by rail.

#### Financial Aid for S.N.C.F.

Under the terms of an agreement between the Government and the S.N.C.F. in 1952 (see our issue of August 15, 1952), in view of the assumption by the State of 60 per cent of permanent way

renewal and maintenance costs, 50 per cent of the costs of operating level crossings, and certain pension commitments, the S.N.C.F. was to make a payment to the State of a variable percentage of its operating receipts rising by 0.5 per cent each year from a minimum of 2 per cent in 1952 to a maximum of 5 per cent in 1958.

A decree was published recently whereby this payment by the S.N.C.F. was to remain at its 1955 level of 3.5 per cent in 1956, whilst as from the beginning of 1957 it is to be discontinued. This benefits the S.N.C.F. to the extent of 2,500 million francs in 1956 and approximately 23,000 million francs in 1957.

### WESTERN GERMANY

#### Saar Railways Absorbed

On incorporation of the Saarland into the German Federal Republic on January 1, the Saar Railways were taken over by the Federal Railway.

#### Four "Trans-Europe Expresses"

Four Federal Railway fast passenger services are to be transformed this summer into "Trans-Europe Expresses," namely, the "Paris-Ruhr" between Dortmund and Paris, "Saphir" between Dortmund and Ostend, "Rhein-Main" between Frankfurt and Amsterdam, and "Helvetia Express" between Hamburg and Zurich. They will be operated on their present schedules, with the exception of the "Helvetia Express" which will be accelerated so as to connect at Basle with the trains to Berne and Geneva and the night express to Milan.

### Publications Received

*Kempe's Engineers' Year-Book, 1957.* Vols. 1 and 2. 62nd Edition. Morgan Brothers (Publishers) Limited, 28, Essex Street, Strand, London, W.C.2. 7 in. x 5 in. x 1½ in. 132 pp. and 1,416 pp. Illustrated. Price (two volumes in case) 82s. 6d.—Major changes in this edition include an entirely rewritten chapter on gearing, while a new section on diesel locomotives has been added to the railway engineering section, which also includes much new matter on electric traction and braking. A new section has been added to include the latest foundry practice relating to shell moulding and the carbon dioxide process. The latest developments in machine tool design have been recorded by the inclusion of further information on copying machines, demagnetisers, and transfer machining processes. Despite the rapid advance in many fields of engineering, such changes are recorded to bring this edition fully in line with contemporary developments.

*Rotary Portable Compressors.*—A description of the principles and operation of their power compressors are provided in an illustrated publication

*Rotary Compressors,* issued by the Consolidated Pneumatic Tool Co. Ltd., 232, Dawes Road, London, S.W.6. The first section deals with lubrication, capacity control, radiation, and cooling systems; sectional illustrations give details of compression operation. The remaining sections deal with specifications of the full range of units manufactured, these being set out on the page opposite the illustration of the particular model.

*Wiggin Nickel Alloys No. 42.*—This latest publication contains an article on the welding of Nimoply 75, a composite metal sandwich consisting of Nimonic 75 firmly bonded on both sides of a copper inter-layer. For many years the high-strength, nickel-chromium alloy Nimonic 75 has been widely used for combustion chamber linings and the new material has been developed to meet the need for a material having the high-temperature characteristics of Nimonic 75 but with considerably improved thermal conductivity. Other articles describe the Inconel components of gas carburising furnaces, the use of Nimonic DS for flare stack tips, uses of Monel in pickling plant, and so on. Copies are avail-

able from the Publications Department, Henry Wiggin & Co. Ltd., Thames House, Millbank, S.W.1.

*Nylastic Adjustable Support Clips.*—Details of Nylastic clips manufactured by Howard Clayton-Wright Limited, of Wellesbourne, Warwickshire, are given in an illustrated leaflet issued by the firm. Various designs depicted include the plain type for use where the temperatures reach 135 deg. C., earthing type for use where electric bonding is required, the StikaStrip rubber type, designed to withstand vibration, and the sponge rubber type.

*Calendars for 1957.*—We have received calendars for 1957 from Sentinel (Shrewsbury) Limited; the Swiss National Tourist Office; South African Railways & Harbours; Swedish Lloyd; Fox Photos; United Steel Companies Limited; Société Générale de Constructions Electriques et Mécaniques Alstom; the Butterley Co. Ltd.; Harrison & Sons Limited; Westinghouse Brake & Signal Co. Ltd.; Fried. Krupp Maschinenfabriken, Essen; *The Railway Review*; Kisha Seizo Kaisha Limited; and East African Railways & Harbours.

## B.T.C. (Railway Merchandise) Charges Scheme, 1957

*Separate scale of maximum charges for bulk and other goods: reasonable charges for owner's wagon traffic: loadability as a charging factor*

**A**N Order confirming the British Transport Commission (Railway Merchandise) Charges Scheme was issued by the Transport Tribunal on December 31, 1956. The scheme embodies amendments made by the Tribunal after hearing objections from interested parties during a public inquiry. The Order states that the scheme is to be printed and published by H.M. Stationery Office and is to come into force on July 1, 1957.

Part I of the scheme is largely concerned with definitions, the most interesting of which is that of "loadability," defined as meaning "in relation to any consignment, the greatest weight of goods identical in every way (save as to total weight) with the goods comprised in the consignment as tendered for carriage, which is reasonably capable of being loaded and safely carried in an open railway wagon with two axles capable of carrying a maximum load of 10 tons and with a cubic capacity of 450 cu. ft., an internal length of 18 ft., and an internal width of 7 ft. 6 in.; provided that in the case of a consignment containing an article or articles exceeding 18 ft. in length the loadability thereof shall be deemed to be that applicable to a consignment containing a similar article or articles of a length not exceeding 18 ft." The word "consignment" means goods which are by their nature suitable for loading together and are tendered at one time accompanied by one consignment note for carriage to one station or place; provided that where the consignor himself loads goods into a wagon or wagons made available to him at a station by the Commission, tender for carriage shall be deemed to take place when he informs the Commission that loading is completed; and that goods handed to the Commission at a station at different times during one day shall be deemed to be tendered at one time if the consignment note accompanies the part thereof first handed to the Commission and contains particulars of the whole consignment. A "terminal station" means a station or place upon the railways of the Commission at which goods are loaded or unloaded before or after conveyance but does not include a junction between a railway of the Commission and any private siding, or in respect of goods passing to or from a private siding any station with which such siding may be connected, or any dock.

### Charges

In Part II, Section A, the scheme defines the traffics and services to which "reasonable" charges are to apply. These are: the carriage by merchandise train of any consignment of or exceeding 100 tons; the carriage by merchandise train of owner's wagon traffic; and

private sidings terminal services in respect of goods carried or to be carried by merchandise train. Any questions as to the reasonableness of charges made by the Commission under these provisions are to be determined on the application either of the Commission or of the person liable to the charge by the Transport Tribunal to the exclusion of any other court. The maximum carriage charges which apply to most traffic cover, for all goods, the provision of wagons, except when the use of a special wagon is necessary; and the provision of sheets when and to the extent to which sheeting is normally required for the protection of the goods. In the case of goods carried from one terminal station to another terminal station they cover conveyance from the station of origin to the destination station: the use of accommodation, other than coal drops, normally and customarily provided at the stations; assistance in loading at the station of origin and in unloading at the destination station when such assistance is normally and customarily afforded at those stations, including the use of plant and machinery normally available; covering of the goods when and to the extent to which covering is normally required for protection and the subsequent uncovering; and such other services as are normally and customarily rendered by the Commission at the stations for or in dealing with goods generally as railway carriers before or after conveyance by railway.

### Private Siding Traffic

Where goods are carried between a terminal station and a private siding, the maximum charges include conveyance of the goods in wagons from the station to the junction with the private siding or, as the case may be, from the junction with the private siding to the station. Provisions as to accommodation, loading, covering, and so on are generally similar to those for terminal to terminal traffic. Where goods are carried from one private siding to another, the charges cover conveyance between the junctions with the two private sidings. There is no reduction in the maximum charge in cases where facilities included in the charge are not used or afforded. Private sidings terminal services are not included in the charge for conveyance. For the purposes of the scheme, a "special wagon" means a wagon required for the carriage of articles of exceptional bulk shape or weight not being a wagon in general use for the carriage of ordinary merchandise.

Where goods are carried to or from a dock, whether or not belonging to the Commission, they are deemed for the purposes of this section of the scheme to be carried to or from a private siding.

Section B of Part II states that the

charges for the carriage of livestock or animals of all descriptions by merchandise train or for the carriage of merchandise by passenger train or other similar service is not to exceed the standard charges, but charges for the carriage of empties by passenger train or other similar service may exceed the standard charges but must not exceed the standard charges in respect of the carriage of general parcels by passenger train or other similar service. The expression "standard charges" means the standard charges in force under the Railways Act, 1921, together with any additional charges the making of which had, immediately before the date on which this scheme comes into force, been authorised by the Minister of Transport & Civil Aviation.

### Chargeable Distances

The distance between any two stations or places on the railways, by reference to which any maximum charge provided in the scheme is ascertained, are to be calculated by taking the mileage by the shortest physical route over the Commission railways between such stations or places via any line or junction which is in service and is capable of carrying any kind of freight train. When goods are carried to or from a private siding the chargeable distance is measured to the junction with the private siding, or, for docks traffic, the place at which the dock railway begins or ends.

The Commission may, however, appoint at or in the vicinity of any station a single place from and to which chargeable distances are to be calculated, provided that no such place is more than one mile by railway from the actual place to or from which carriage is effected. Also, the Commission may group stations and places in the same town or locality and appoint a single distancing point within any such group, provided that no such grouped station or place is more than five miles by railway from the appointed distancing point. For any such group the chargeable distance to or from any place within the group is the distance to or from the distancing point.

The Commission may make reasonable charges for the use of certain services and facilities specified in the scheme. These include collection or delivery; splitting of a consignment at the receiving station; carriage over any dock railway belonging to the Commission; the conveyance of railway vehicles running on their own wheels, including engines and any wagon conveyed empty for the purposes of owner's wagon traffic; tolls for the use of railway lines by traffic drawn by engines not belonging to the Commission; the provision of containers if requested by the trader; covering and



uncovering of merchandise in transit, at the request of the trader, when such service is not normally required, or the provision of sheets for any purpose other than the covering of traffic; provision of special wagons; the alteration, in connection with the carriage of any merchandise, of any wagon or the provision of any exceptional or special services or facilities or the making of exceptional or special working arrangements necessary for the carriage of any merchandise.

Reasonable charges may also be made for accommodation provided or services rendered in connection with the withdrawal, in the course of transit, of any wagon not belonging to the Commission and any goods in it, for the purpose of effecting repairs, including transhipment of goods to another wagon. Certain services rendered at the request or for the convenience of traders, unless a trader has given notice in writing to the Commission that he does not require them, are subject to reasonable charges.

### Conditions of Carriage

Subject to the provisions of sections 14 and 72 (1) of the Transport Act, 1947, which deal respectively with existing agreements and the substitution of the Transport Tribunal for the Railway Rates Tribunal, the terms and conditions on and subject to which merchandise will be accepted for carriage by railway by the Commission are to be the Standard Terms and Conditions of Carriage, which are deemed to be reasonable. The "Standard Terms and Conditions of Carriage" means the terms and conditions contained in S.R. & O. 1927 No. 1009 and 1940 No. 2166 as modified by the provisions of the third schedule to the scheme. There are provisions for carriage at owner's risk and for the carriage of dangerous goods, and for special agreements in writing.

The Commission is to keep at each station where merchandise is received for carriage by railway or, where merchandise is received for carriage at some place other than a station, at the nearest station, a copy of the scheme; a book showing the maximum charges for livestock and so on by merchandise train and for merchandise by passenger train or other similar service; a book showing the chargeable distance from that station or place of every station or place on the Commission railways to which it books; a list of those goods which the Commission for the time being has declared to be dangerous goods; and a list of such merchandise for which the Commission offers owner's risk rates. All these books and documents are to be, during reasonable hours, open to the inspection of any person without payment of fee. Apart from these provisions, the Commission is under no obligation to publish any charges provision for which is made by the scheme.

There are two tables of maximum charges, A and B, the first covering bulk traffic and the second other goods.

"Bulk traffic" means, for this purpose, unpacked consignments of certain goods weighing 4 tons or more and having a loadability of 4 tons or more. These include ashes, cinders, and slag; blocks, slabs, and fencing of concrete or ferro-concrete, plain, solid; blocks and slabs of plaster composition, plain, solid; bricks (building) solid and unglazed, slates, tiles, and stone blocks roughly wrought; clay, earth, gravel, sand, stone, ores, and other minerals, as mined or quarried, or calcined or concentrated; coal, coke, and patent fuels made therefrom; iron and steel bars, billets, blooms, ingots, plates, rails, rods, sheets, strip, and scrap; pig iron, ferro-chrome, ferro-manganese, ferro-silicon, and spiegeleisen; road making and repairing materials, tarred or undressed; and salt, lime and gas lime.

In the case of any consignment having a weight of or above 10 cwt. but not exceeding 1 ton, the maximum carriage charge is to be the amount ascertained in accordance with Table B plus 1s. per consignment. If the weight is below 10 cwt., the maximum carriage charge is the amount ascertained in accordance with Table B plus 2s. 6d. per consignment.

### Chargeable Weight

Where the maximum carriage charge ascertained as above would be greater than the maximum carriage for a consignment of a greater weight of the same goods, the charge is to be that ascertained for the consignment of the greater weight.

There are also provisions respecting reckoning of weights, dealing with fractions of a penny, and special clauses with reference to timber weight, small loads in one wagon, and long articles.

The third and last schedule deals with modification of the Standard Terms and Conditions of Carriage, the most important being a revaluation for liability purposes of certain animals.

### Maximum Charges

The tables are divided into three sections, showing respectively maximum carriage charges from one terminal station to another, from one private siding to another, and from a terminal station to a private siding or vice versa. Each section is subdivided into a rate for the first 10 miles or any part thereof, and for each additional mile or part of a mile.

The charges are based on weight and loadability, thus, for a bulk consignment weighing 10 tons or more and having a loadability of 10 tons, the maximum charge for the first 10 miles is 21s. 6d. a ton from one terminal station to another, 15s. 6d. a ton from private siding to private siding, and 18s. 6d. a ton from terminal station to private siding. In each category the charge for extra mileage is 3½d. per ton per mile. For a consignment weighing 8 tons or more and having a loadability of 8 tons or more but less than 10 tons the corresponding maximum charges are 25s., 17s. 6d., and 21s. 3d., with a charge of 3½d. for each additional mile. For

consignments weighing 6 tons or more and having a loadability of 6 tons or more but less than 8 tons the charges are 30s., 20s. 6d., and 25s. 3d., with 4d. per mile for extra mileage. Finally, bulk consignments weighing 4 tons or more and having a loadability of 4 tons or more but less than 6 tons are charged at 42s., 29s., and 35s. 6d. a ton respectively with 5½d. a mile for extra mileage.

The four sets of rates quoted also apply, in order, to bulk consignments of one or more articles each of a weight of 10 tons or more, consignments having a weight of 8 tons or more but less than 10 tons and having a loadability of 8 tons or more, consignments having a weight of 6 tons or more but less than 8 tons and having a loadability of 6 tons or more, and consignments having a weight of 4 tons or more but less than 6 tons and having a loadability of 4 tons or more.

The tables for other than bulk traffic are divided in a similar manner. For any consignment having a weight of 10 tons or more and a loadability of 10 tons, or for any consignment of one or more articles each of a weight of 10 tons or more the maximum charges are 24s. 6d., 18s. 6d., and 21s. 6d. a ton for the three categories with an additional charge of 2½d. for each mile over 10. For any consignment having a weight of 8 tons or more and having a loadability of 8 tons or more but less than 10 tons, or having a weight of 8 tons or more but less than 10 tons and having a loadability of 8 tons or more, the charges are 28s., 21s., and 24s. 6d., with a charge of 3½d. for each extra mile.

For any consignment having a weight of 6 tons or more and having a loadability of 6 tons or more but less than 8 tons, or having a weight of 6 tons or more but less than 8 tons and having a loadability of 6 tons or more, the charges are 34s., 24s. 6d., and 29s. 3d., with 3½d. a mile for extra mileage. For any consignment having a weight of 4 tons or more and having a loadability of 4 tons or more but less than 6 tons, or having a weight of 4 tons or more but less than 6 tons and having a loadability of 4 tons or more, the charges are 48s., 35s. and 41s. 6d., with 5d. a mile for extra mileage. For any consignment having a weight of 3 tons or more and having a loadability of 3 tons or more but less than 4 tons, or having a weight of 3 tons or more but less than 4 tons and having a loadability of 3 tons or more, the charges are 62s., 43s. 6d., and 52s. 9d., with 6d. a mile for extra mileage.

For any consignment having a weight of 2 tons or more and having a loadability of 2 tons or more but less than 3 tons, or having a weight of 2 tons or more but less than 3 tons and having a loadability of 2 tons or more, the charges are 88s., 62s., and 75s., with 8d. a mile for extra mileage. Any consignment not falling within one of the descriptions already given will be charged at 155s., 111s. 6d., and 133s. 3d., with 1s. 2d. for each mile over 10.

## Automatic Pore Water Pressure Indicator

*A new device for automatic pore water pressure determination*

By L. J. Burton,

*Soil Mechanics Laboratory, British Railways, Western Region*

THE shear strength properties of a soil may be derived from the results of a series of triaxial compression tests. In these tests a cylinder of soil is enclosed in a rubber membrane and is subjected to a constant external water pressure and a vertical stress which is increased until failure occurs. During the test, internal water pressures are developed within the pores of the soil. As the shear strength of the soil depends on the difference between the external stresses and the internal pore pressure, it is necessary in certain cases to measure these pressures.

To ensure that no dissipation of pore pressure occurs, the volume of the sample must be kept constant. Most normal methods of pressure measurement involve some volume change to actuate the measuring device and are therefore unsuitable.

An electro-mechanical device has been designed in the British Railways, Western Region Soil Mechanics Laboratory which enables the pore pressure to be measured whilst maintaining constant the volume of the sample. The overall efficiency of the device is such that for a saturated sample of soil 4 in. in dia., 8 in. long, and with a porosity of 20 per cent, the movement

of water can be restricted to approximately 1 part in 400,000 of the pore water.

The pore water pressure set up

during the test is communicated to one side of the mercury U-tube. On the other side of the U-tube there is a displacement system consisting of an actuator operating hydraulic bellows, and a pressure gauge. The system is filled with distilled de-aerated water.

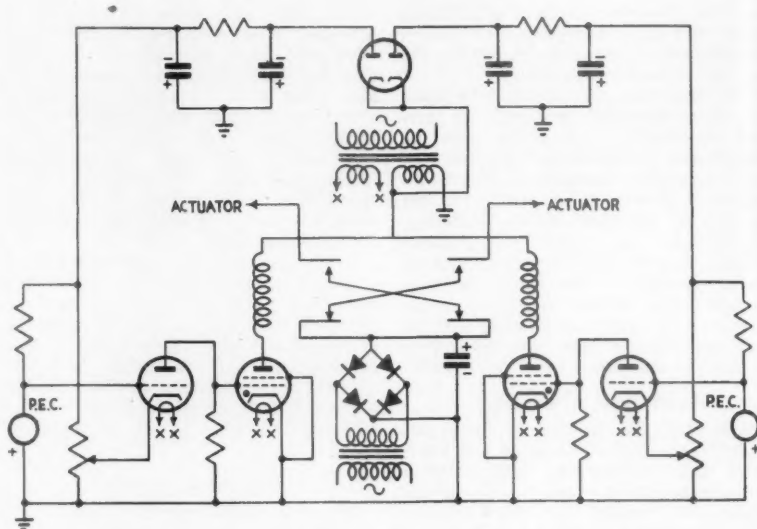
### U-Tube and Displacement System

At the levels of the mercury in the U-tube are two photo-electric cells coupled to a sensitive amplifier which controls the actuator operating the bellows. Any movement of the pore water tends to alter the mercury level. This, in turn, via the photo-electric cells, unbalances the amplifier and the actuator operating the bellows moves until balance is restored. The opposing forces on the mercury column are then equal, and the pressure shown on the gauge is equal to the pore water pressure.

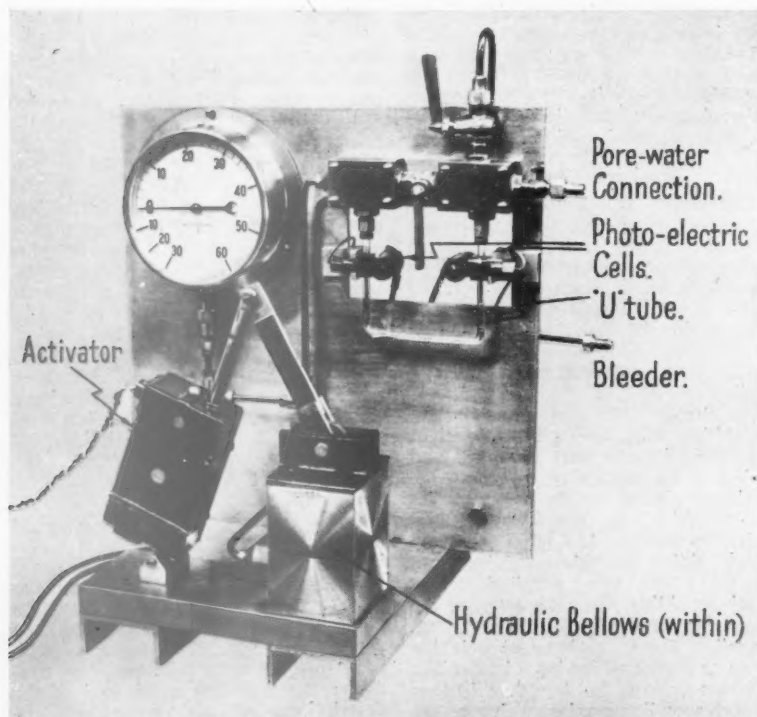
### Amplifier

The amplifier consists of two identical systems terminating in two interconnected relays which control the movement of the actuator. Each amplifier system is as follows:—A gas-filled photo-electric cell feeds into a triode voltage amplifier which in turn is directly coupled to a gas-filled tetrode having one of the two relays as its anode load. The power pack of the amplifier, in addition to supplying the valves, provides 12 V. d.c. for the operation of the actuator and 4 V. a.c. which supplies the two lens bulbs used in conjunction with the P.E.Cs.

(Continued on page 48)



*Circuit diagram of amplifier for photo-electric cells*



*General view showing layout of indicator*

# Track Loading Fundamentals—1

## Introduction: track and wheel loading

By C. W. Clarke, M.I.C.E., M.I.Mech.E., M.I.E.Aust., M.Inst.T.

THE railways in comparatively new countries, such as Australia, besides having to deal with the problem of unification of gauge, have to determine the future of many developmental lines constructed during the pioneer days to open up the hinterlands. The problem is similar to that existing in America during the close of the last century. The development of the modern high-speed diesel engine has, especially in areas where traffic volume is light, resulted in favour of road transport, but the primary producer and heavy industries of a country still depend essentially on rail transport.

Today there is a pressing need to increase axleloads to meet traffic demands, and it becomes necessary to determine action to be taken to improve the quality of the permanent way and the maximum axleloads permitted on existing lines. This series of articles describes how the axleloads permitted and the design of the way have been determined.

The distribution of contact pressures between the sleeper and the ballast depends on the elastic properties of the sleeper and the physical properties of the ballast material. The vigorous computation of the vertical pressure at any point in a semi-infinite solid is given by one of the series of the Boussinesq equations and the use of charts giving influence areas, or by the use of tables computed by Newark. The footing of a sleeper is not rigid, and because of the wave-like motion in the rail the load on the rail-seat would travel from one edge of the sleeper to the other with the passage of a wheel, and this makes it difficult to determine the unit loading on the sleeper footing. Determination of the distribution of pressure in the roadbed soil would mean a further complication, as the rigorous computation is given by the theory of an elastic layer acted upon by a flexible load on a finite area, and the physical properties of the sub-grade can vary in essential character and the degree of adhesion between the ballast section and the sub-grade would be a factor difficult to determine. These computations would be too complicated for practical application.

For the determination of ballast depth the author attempts a more direct approach and establishes simplified empirical formulae, which for ballast depths in practice are in fair agreement with the more rigorous computations. The empirical formulae deduced have a rational basis.

### Soil Loading Test

The soil loading test using a 30-in. dia. plate corresponds roughly to the bearing area on the roadbed under a rail-seat. This test establishes the modulus of the sub-grade reaction and

from it the engineer deduces the safe average bearing pressure of the soil.

The formulae deduced are for the average rather than the maximum intensity of pressure on the roadbed, and their application is related to the safe average bearing pressure the soil of the roadbed will support.

The rail stresses produced by any given wheelbase and wheel loading can be represented by the stresses produced by an equivalent isolated wheel load. Similarly, the resulting track depression can be represented by that produced by another equivalent isolated wheel load. The author terms these equivalent isolated wheel loads, which will produce the same maximum rail stresses and track depressions as the given wheelbase, the Talbot and Zimmermann wheel loads respectively.

### Track and Wheel Loading

The wheel load which a railway track will carry with safety at specified speed is dependent on the section of rail used and the intensity of pressure on the formation. The section of the rail used must be such that it will carry the resulting wheel loads without exceeding the safe stress values permitted for steel rails, and the size and spacing of sleepers and quality and depth of ballast under the sleepers must be such that the resulting intensity of loading on the roadbed or formation does not exceed the value which the soil of the road-bed can carry permanently without damage.

The first consideration, therefore, is to determine the minimum weight of rail required to carry resulting wheel loads, and then, for a given sleeper size and spacing, to determine the depth of ballast required to ensure that the intensity of pressure on the roadbed does not exceed the value which the soil will carry with safety. No track should limit the operating performance of trains and when being constructed should anticipate reasonable progress in wheel loads and speeds.

The general practice amongst railway engineers has been to specify the maximum axleload permitted for a locomotive on a given weight of rail, irrespective of axle spacing. Whilst this rather empirical rule serves as a rough guide, it has no true physical meaning<sup>1</sup>.

### Determination of Track Stresses

The basic problem in designing a railway track is to transfer the forces produced by rolling wheel loads on the rail head to the roadbed, and to keep the unit bearing pressure on the roadbed within safe limits.

It is now generally accepted that the sinking of track, due to the passage of a railway vehicle, is based on the theory of a continuous member supported on an elastic foundation. The depression

of the track can be calculated from a sinusoidal function subject to a diminishing exponential. The bending moment in the rail can be calculated from the second derivative of this function. If the rail is subject to various loads at known spacings the superposition of the curves for individual wheel loads gives the resulting track depression or bending moment.

In practice, the fact that the rail is not supported continuously along its length but at intervals of sleeper spacings introduces a slight error, but it makes little difference and results deduced from the elastic theory are in close agreement with test values. The rail stresses calculated by the elastic theory are higher than those calculated by considering the rail as a simple beam resting on two supports, or by considering the rail as a continuous beam on rigid supports, and the theory shows that the load is spread over a number of sleepers, thus reducing the pressure on individual sleepers. It should be remembered that originally rails took the form of a short beam resting on two supports, usually made of masonry, whereas modern rails are generally supported on at least 16 sleepers laid on a continuous ballast section.

Probably the first work on the determination of track stresses and deformation was undertaken by Professor B. Barlow<sup>2</sup> in 1835, and determination of track stresses by the elastic theory was made by Zimmermann<sup>3</sup> in 1888. Perhaps the most extensive work on the subject was that conducted in the United States of America, under the direction of Professor A. N. Talbot<sup>4</sup>.

A more exact solution of the bending of the rail supported on individual elastic supports, and the loads carried by the elastic supports (sleepers) has been deduced by the systematic relaxation of constraints, and the loads carried by the sleepers have been determined by an extension of Clapeyron's theorem of three moments and by the use of calculations of variations<sup>5</sup>.

It is not surprising, therefore, that many engineers feel that theoretical analysis of track stresses is at the most approximate, and that practice without waiting for theory has determined the dimensions of track components for any particular application. No calculation of track stress or deformation can be regarded as exact. The variables involved are numerous, but a usable analytical treatment is of great value in the comparison of experimental data and for the determination of probable track stresses produced by any new design of vehicle.

In the elastic theory the rigidity of the foundation, usually denoted by the letter  $U$  and known as the elastic modulus of the track, is the load in pounds per lineal inch of rail which



will depress the track one inch. It is determined by measuring the summation of the deflections of the sleepers depressed due to a known load, or more accurately by measuring the differences in deflections between a light and a heavy load.

The value of  $U$  ranges in practice from about 400 to over 3,000 as extreme cases. The general average for track laid with rails 45-lb. to 55-lb. per yard is about 700; for track suitably ballasted and laid with 60-lb. to 80-lb. rails about 1,000; for track laid with rails 90-lb. to 115-lb. about 1,600, and for track laid with heavier rails about 2,000. These values should be taken as a guide only and can vary greatly in practice. They need to be determined for local conditions by field tests. Fortunately a large variation in the value of  $U$  makes little difference to the rail stress, but it does have an appreciable effect on the distribution of pressure on the roadbed.

From the fundamental conditions, the particular differential equation is

$$EI \frac{d^4 y}{dx^4} = -Uy \quad (1)$$

or

$$EI \frac{d^4 y}{dx^4} + Uy = 0 \quad (2)$$

In practice the above fundamental equation has certain limitations and needs correction due to eccentric loading on a canted rail and the effect of speed, both of which increase rail stresses, and an arching effect in the rail when sleepers become consolidated in the track formation which affords relief of stress.

It is probable the more correct equation would be

$$EI \frac{d^4 y}{dx^4} + \lambda \frac{d^2 y}{dx^2} + Uy = 0 \quad (3)$$

or if the effect of speed is considered

$$EI \frac{d^4 y}{dx^4} + m \frac{d^2 y}{dx^2} + \psi \frac{dy}{dx} + Uy = f(x) \quad (4)$$

As the rail stress values would be modified by a similar order in each case, and since science has not yet been able to allow for all unknown factors within any close degree of accuracy, equation 2 is retained for the purpose of the comparative analysis being considered, with appropriate allowances for increase in stresses due to perturbations of a vehicle at speed.

Due to a concentrated load, the rail takes the form of what is commonly known as a Zimmermann curve, the vertical ordinate of which at any point gives the depression of the track and can be expressed mathematically<sup>6</sup> by the solution of equation 2, given by

$$y = -\frac{P}{\sqrt[4]{64EIU^3}} \cdot e^{-Bx} (\cos Bx + \sin Bx) \quad (5)$$

and the bending moment at any point by

$$M = P \sqrt[4]{\frac{EI}{64U}} \cdot e^{-Bx} (\sin Bx - \cos Bx) \quad (6)$$

where

$$B = \sqrt[4]{\frac{U}{4EI}} \quad (7)$$

and

$$EI = \text{flexural rigidity of rail} \quad (8)$$

The relative values of  $y$  and  $M$  are shown in Fig. 1.

The distance from the load  $P$  to the point of zero bending moment in the rail is given by equation 6 and for  $M = 0$  gives

$$X_1 = \frac{\pi}{4} \sqrt[4]{\frac{4EI}{U}} \quad (9)$$

$$= 82 \sqrt[4]{\frac{1}{U}} \text{ inches} \quad (10)$$

The distance to the point of contraflexure of the rail is given by equation 5, and for  $p = 0$  gives

$$X_2 = \frac{3\pi}{4} \sqrt[4]{\frac{4EI}{U}} \quad (11)$$

$$= 3X_1 \quad (12)$$

The maximum depression and the maximum bending moment occur under load  $P$ , and are, from equation 5

$$y_0 = \frac{P}{\sqrt[4]{64EIU^3}} \quad (13)$$

$$= \frac{0.005 P}{\sqrt[4]{UI^3}} \quad (14)$$

$$= \frac{0.39 P}{UX_1} \text{ in.} \quad (15)$$

and from equation 6

$$M_0 = P \sqrt[4]{\frac{EI}{64U}} \quad (16)$$

$$= 26.17 P \sqrt[4]{\frac{1}{U}} \quad (17)$$

$$= 0.318 PX_1 \text{ in.-lb.} \quad (18)$$

The maximum value of the tensile stress in the rail is given by

$$f_0 = \frac{M_0}{Z} \quad (19)$$

$$= \frac{26.17 P}{Z} \sqrt[4]{\frac{1}{U}} \quad (20)$$

$$= \frac{0.318 PX_1}{Z} \text{ p.s.i.} \quad (21)$$

The intensity of pressure against the underside of the rail is given by

$$p = -Uy \quad (22)$$

and the maximum intensity of pressure occurs under load  $P$ , and from equation 13, gives

$$p_0 = \frac{UP}{\sqrt[4]{64EIU^3}} \quad (23)$$

$$= 0.005 P \sqrt[4]{\frac{U}{I}} \quad (24)$$

$$= \frac{0.039 P}{X_1} \text{ lb./lineal in.} \quad (25)$$

when the rail-seat load on any individual sleeper is given by

$$q = UyS = p \cdot S \text{ lb.} \quad (26)$$

and the maximum rail-seat load on a sleeper is

$$q_0 = 0.005 P.S. \sqrt[4]{\frac{U}{I}} \text{ lb.} \quad (27)$$

$$= 0.39 P.S./X_1 \text{ lb.} \quad (28)$$

The curves shown in Fig. 1 might be considered as the master curves showing the relative values for track depression and bending moment in the rail and are influence lines for a moving

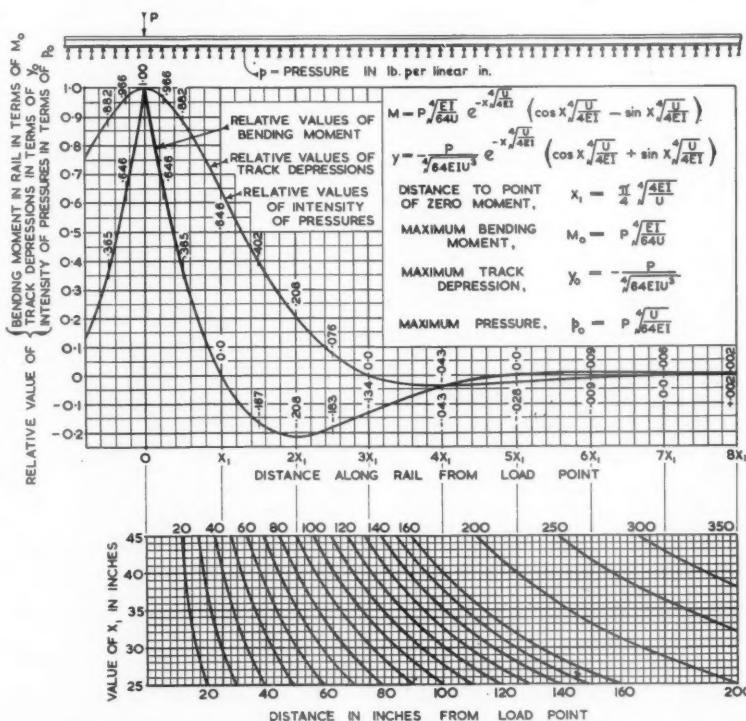


Fig. 1—Curve showing relative values of rail depression and bending moments

load  $P$ . By constructing a suitable scale for the values of  $X_1$  a chart is obtained suitable for general application. To use the chart run down the diagonal line giving distance from wheel being considered to the appropriate value of  $X_1$  for the track, then run up the vertical line to determine the relative value of the bending moment or track depression on the master curves.

If the rail is subjected to various loads at known spacings, as shown in Fig. 2, the super-position of the curves for individual wheel loads give the re-

Professors Zimmermann and Talbot were eminent research workers in this field, and the terms Zimmermann and Talbot loads coined by the author, help to give a clear concept of the equivalent isolated loads which will produce the same maximum track depression and rail loading as those produced by the wheelbase and wheel loads of a vehicle.

It will be noted the Talbot load for static conditions is usually of lower value than the maximum wheel load in a wheelbase, whereas the Zimmermann load is always of greater value

actual wheel load is an index of the magnitude of the loading on the formation produced by the vehicle. It is suggested this ratio be represented by  $C_0$ , when

$$C_0 = \frac{\text{Zimmermann wheel load}}{\text{Max. actual wheel load}} \dots (31)$$

$$= \frac{ZLv}{P} \dots (32)$$

The objective of the designer of a locomotive or railway vehicle is to arrange the wheel loads and spacings so as to obtain optimum values for the

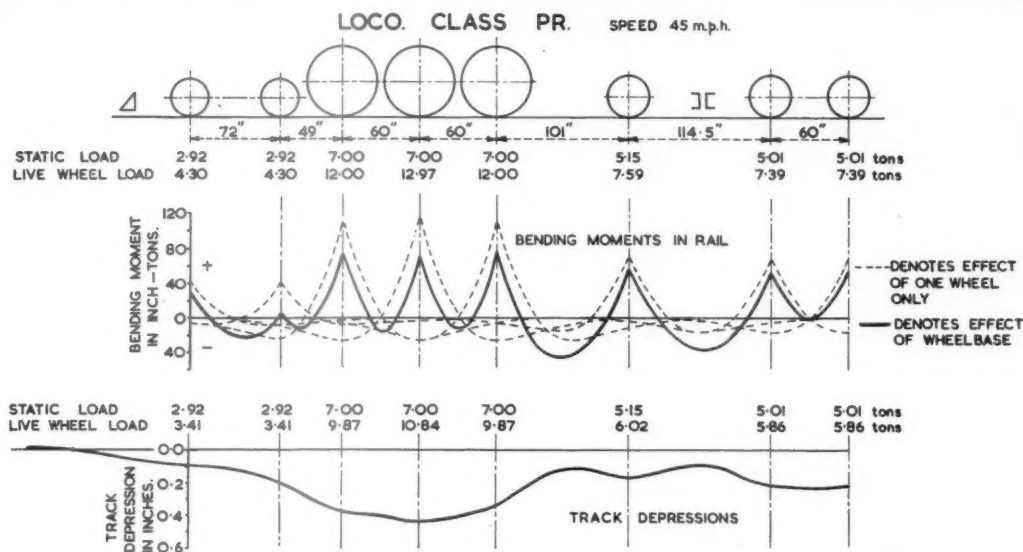


Fig. 2—Rail bending moment and depression curves for a 4-6-2 locomotive

sulting bending moment in the rail and the resulting track depression. The relative bending moment or track depression curve due to each wheel is drawn under the particular wheel, and the algebraic sum of the ordinates gives the resulting bending moment or track depression.

It should be noted how a wheel affords stress relief to neighbouring wheels, but increases the track depression caused by neighbouring wheels. Also, that the value of  $X_1$  or  $X_2$  is the same for each wheel load on a given track but the ordinate at any point on the curve is proportional to the wheel load.

The equivalent isolated wheel load which will produce the same rail stress as the resulting maximum wheel load, deduced from a consideration of relief of stress from neighbouring wheels in a wheelbase might, it is suggested, be referred to as the "Talbot" load, denoted by  $TL$ .

Similarly, the equivalent isolated wheel load which will produce the same track depression as the resulting maximum track depression, deduced from a consideration of track depressions caused by neighbouring wheels in a wheelbase, might, it is suggested, be referred to as the "Zimmermann" load, denoted by  $ZL$ .

than the maximum wheel load in a wheelbase. The Talbot load at permitted speed for any specific wheelbase is the load determining maximum rail stresses produced and the Zimmermann load the load determining maximum track depression and intensity of pressure on the roadbed.

Although the track is depressed with the passage of a wheel, the trajectory of the axle between rail joints is practically a straight line, but at a rail joint there is a high frequency vertical movement. The amplitude of the vertical movement of the axle at a bad rail joint may not exceed  $\frac{1}{4}$  in., but the vertical acceleration at speed can be between 4 g. and 12 g. and in the case of drives with axle-hung motors as high as 30 g.

#### Loading Indices and Track Constants

The ratio of the Talbot wheel load at specified speed to the maximum wheel load of a vehicle is an index of the magnitude of the rail stresses produced. It is suggested this ratio be represented by  $C$ , when

$$C = \frac{\text{Talbot wheel load}}{\text{Max. actual wheel load}} \dots (29)$$

$$= \frac{TLv}{P} \dots (30)$$

The ratio of the Zimmermann wheel load at specified speed to the maximum

indices for rail stress and roadbed loading, bearing in mind that the wheel loads and spacing are such that the specified B.U. loading for bridges is not exceeded.

For a given rail section and wheel load the bending moment decreases as  $U$  increases and increases as  $X_1$  increases. In the case of an isolated wheel the reduction in rail stress, since stress is proportional to bending moment for a given section modulus, would be inversely as the fourth power of  $U$  or directly as  $X_1$ . For a close-spaced wheelbase it can be shown that for all practical purposes the variations in bending moment or in track depressions for any wheel are of the same order. If the values are plotted on a graph against varying values for  $U$  the ordinates for each curve are proportional to the ordinates for the values of  $X_1$  for the particular track conditions. The small discrepancies can be attributed to the higher harmonics in the bending moment or track depression curves.

If for given track constants  $I_0$  and  $U_0$  the values  $TL_0$ ,  $ZL_0$  and  $X_1$  are computed, then the corresponding values for track constants  $I_p$  and  $U_p$  would be

$$X_p = X_1 \sqrt[4]{\frac{I_p \cdot U_0}{U_p \cdot I_0}} \dots (33)$$



$$TLp = TL_0 \cdot Xp/X_1 \dots\dots\dots (34)$$

$$ZLp = ZL_0 \cdot Xp/X_1 \dots\dots\dots (35)$$

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<sup>5</sup> "Calculation of Bars of Infinite Length on Resilient Bearings with Notes on the Depression given to a Bearing by Loading Another Bearing"—Ir. W. J. Van der Eb and Dr. A. D. de Pater, *I.R.C.A. Bulletin*, January, 1952.

<sup>6</sup> M. A. Biot, *Journal Applied Mechanics*, Vol. 4, March, 1937, American Society of Mechanical Engineers, shows this solution is not strictly correct and gives a more precise solution

## SYMBOLS AND UNITS USED

A = Cross sectional area of rail, sq. in.  
C = Rail-stress index  
C<sub>0</sub> = Road-bed loading index  
D = Diameter of driving wheel, in.  
E = Young's modulus of elasticity (for steel 30,000,000 p.s.i.)  
F = Coefficient for stress relief in rail due to neighbouring wheels  
F<sub>0</sub> = Coefficient for increment in track depression or loading due to neighbouring wheels  
H = Hammer blow for wheel, lb.  
I = Moment of inertia of rail section, in.<sup>4</sup>

I<sub>p</sub> = Particular value of I for a specific track, in.<sup>4</sup>

J<sub>0</sub> = Adjusted static wheel load, lb.

J<sub>v</sub> = Live wheel load at Speed V, lb.

K = Impact factor (a coefficient) for determination of rail stresses

K<sub>0</sub> = Impact factor (a coefficient) for determination of track depression or loading

L = Effective bearing length of sleeper under rail-seat, in.

M = Bending moment, in.-lb.

M<sub>0</sub> = Bending moment under wheel load, in.-lb.

P = Wheel load, lb.

Q = Distance from end of sleeper to rail-seat axis, in.

R = Area at base of ballast pyramid on roadbed, sq. in.

S = Sleeper spacing, in.

T = Traction augment due to main crankpin or motored wheel, lb.

U = Modulus of track foundation, lb./sq. in.

U<sub>0</sub> = Particular value of U for a specific track, lb./sq. in.

V = Speed, m.p.h.

W = Weight of rail, lb. per yd.

X<sub>1</sub> = Distance from wheel load to point of zero bending moment in rail, in.

X<sub>2</sub> = Distance from wheel load to point of contraflexure in rail, in.

X<sub>p</sub> = Particular values of X<sub>1</sub> for a specific track, in.

Z = Section modulus of rail, cu. in.

b = Width of sleepers, in.

c = Factor dependent on width of sleeper

d = Depth of ballast below sleeper, in.

e = Base of Napierian logarithmic system = 2.71828

f = Stress in rail, p.s.i.

f<sub>0</sub> = Stress in rail under wheel load, p.s.i.

g = Acceleration of gravity, ft./sec.<sup>2</sup>

k = Influence factor for vertical stress in the soil

p = Upward pressure against rail, lb. per in.

p<sub>0</sub> = Upward pressure against rail under wheel, lb. per in.

p<sub>a</sub> = Average intensity of pressure on roadbed, p.s.i.

p<sub>m</sub> = Maximum intensity of pressure on roadbed, p.s.i.

q = Uniformly distributed contact load on a sleeper, lb.

q<sub>0</sub> = Maximum load under rail-seat on a sleeper, lb.

t = Thickness of sleeper, in.

y = Depression of rail at any point, in.

y<sub>0</sub> = Depression of rail under wheel, in.

BU = British Unit loading for bridges

TL<sub>0</sub> = Talbot load at speed 0+, lb.

TL<sub>v</sub> = Talbot load at speed V, lb.

TL<sub>p</sub> = Particular Talbot load value for a specific track, lb.

ZL<sub>0</sub> = Zimmermann load at speed 0+, lb.

ZL<sub>v</sub> = Zimmermann load at speed V, lb.

ZL<sub>p</sub> = Particular Zimmermann load value for a specific track, lb.

ξ<sub>0</sub> = Equivalent isolated wheel load, static, lb.

ξ<sub>v</sub> = Equivalent isolated wheel load, at speed V, lb.

μ = Coefficient of sliding friction

(To be continued)

## Automatic Pore Water Pressure Indicator

(Concluded from page 44)

The usual employment of the amplifier is with both cells light, i.e., with the mercury column just admitting the light to both cells with the pressure system in a condition of balance. A slight unbalance will darken one P.E.C. (the other remaining light); the consequent change of signal from the darkened P.E.C. will cause the relay in that particular amplifier to close and the actuator will move in the correct sense to balance the pressure system. The two relays are interconnected in a "throat cutting" circuit, this being an arrangement whereby when a relay pulls it cuts off the 12-V. d.c. supply to the opposite relay. This is to obviate damage which might be caused if both relays pulled or were accidentally depressed by hand.

This interconnection, however, gives rise to an interesting variation in the operation of the apparatus, the ability to have equally efficient operation with both P.E.Cs. darkened, both relays are pulled and so no current reaches the actuator, but when unbalance occurs the cell which is illuminated releases its relay and in so doing passes the 12-V. d.c. supply to the relay on the illuminated side thus causing the actuator to move in the correct sense to balance the pressure system.

The amplifiers are fitted with a potentiometer in the cathode circuit of each triode, to enable the circuit to be adjusted to the correct working point for

change of light condition at the P.E.Cs. Switches are provided for isolating the actuator whilst setting up the pressure system. Two neon lamps are fitted to each tetrode to indicate their condition whilst adjusting the potentiometers.

The author is indebted to Mr. M. G. R. Smith, Chief Civil Engineer, British Railways, Western Region, for permission to publish this article and to Mr. J. M. Waters, Soil Mechanics Laboratory, Western Region, for his advice on the soil mechanics aspect of the article.

NEW STATION AT SCALE HALL.—Work has begun on the building of the new station at Scale Hall on the electrified line of the London Midland Region between Morecambe and Heysham, and it is stated that it should be ready for use by Whitsuntide. The opening of the station will provide an electric train service to and from Lancaster and Morecambe for residents on the new housing estate.

OVERSEAS ACTIVITY OF CROMPTON PARKINSON LIMITED.—At the annual general meeting of Crompton Parkinson Limited held on December 12, reference to which has already been made on page 627 of our issue of November 23, the chairman, Mr. Albert Parkinson, spoke of the overseas development in which the company had been engaged. In Australia, at Campbelltown, a 250-acre site was now in its first stage of development. In India the company was extending its range of manufacture, particularly in the field of switchgear, and in Canada the new switchgear company at Brantford, Ontario, had commenced production and was rapidly expanding its output. He reiterated the

belief of the board in the future development of the British Commonwealth and the correctness of their policy of expanding the company's Commonwealth activities whenever a suitable opportunity arose. In the electric traction field the company was particularly heavily committed. As sub-contractors for the supply of electric traction equipment to be used on locomotives manufactured by British Railways and others, the traction division had received very substantial orders.

ALL-STEEL LIFTING JACKS.—The range of all-steel ratchet-lifting jacks manufactured by Rotary Hoes Limited, West Horndon, Essex, has been added to by the production of a 10-ton model known as the Equilift. The jack, which is tested 12½ tons, has an overall height when closed of 16 in., and when raised 25½ in. Equal lift is obtainable from both head and foot, the height of the foot when closed is 1½ in., and when raised 11 in. Both the five and 10-ton jacks will, in future, be marketed under the trade name of Equilift.

EAST COAST ROUTE "CAR SLEEPER LIMITED."—The Eastern Region has announced that the "Car-Sleeper" facility between Kings Cross and Perth will again operate this year. Trains will leave Kings Cross each night except Fridays during the period May 5 to September 28 inclusive and also on Saturdays March 30 to May 4 inclusive, Wednesday, April 17, and Sundays, October 6 and 13. Departures from Perth will be each night except Fridays May 6 to September 28 inclusive and also on Sundays March 31 to May 5 inclusive (except April 21), Thursday, April 18, Monday, April 22, and Saturdays, October 5, 12, and 19. First introduced in 1955, this service has proved extremely popular.

## RAILWAY NEWS SECTION

## PERSONAL

Mr. G. di Raimondo, Director General of the Italian State Railways, has retired. He has been succeeded by Mr. S. Rissone, Chief of the Naples Department.

Mr. Arthur Frank Kirby, C.M.G., M.Inst.T., General Manager, East African Railways & Harbours, who, as recorded in the New Year Honours List, is to become a

he became General Manager Palestine Railways, a position which carried also the management of the Kantara-Rafa Railway in Egypt and the Director-Generalship of the Hejaz Railways in Trans-Jordan. He took over the Palestine section of the then newly-opened Haifa-Beirut-Tripoli military railway in September, 1942, and, the following year, became also Port Authority for all Palestine. From 1944 onwards he served as Chairman of the Palestine Transport

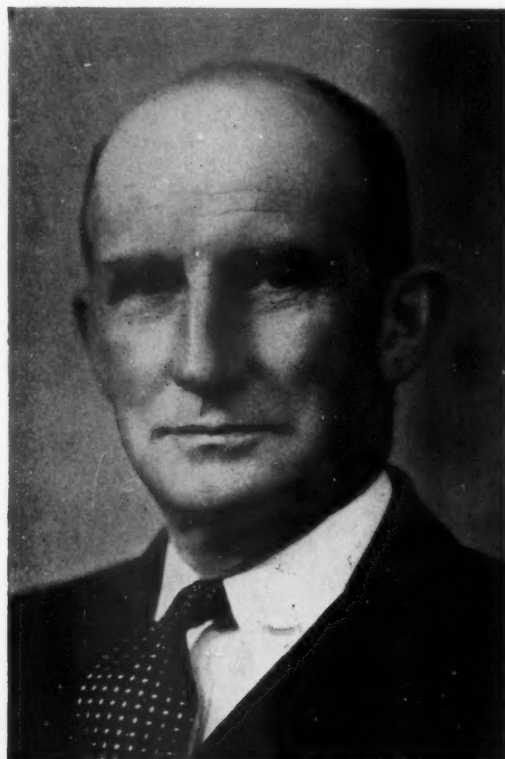
Acting Commissioner, and, in 1953, General Manager of East African Railways & Harbours.

Mr. J. C. L. Train, C.B.E., M.C., M.I.C.E., Member, British Transport Commission, who, as recorded in our January 4 issue, has been awarded a Knighthood in the New Year Honours List, began his career with the North British Railway as an apprentice in 1908. In 1912 he became Junior Engi-



*Mr. A. F. Kirby*

General Manager, E.A.R. & H., who is to become a K.B.E.



*Mr. J. C. L. Train*

Member, B.T.C., who has been awarded a Knighthood

Knight Commander of the British Empire, was born on July 13, 1899, and educated at Sir William Borlase's School, Marlow, and London University. He began his railway career with the Great Western Railway in 1916. During the 1914-18 war he served with the London Rifle Brigade and Second Rifle Brigade in Flanders, subsequently returning to the G.W.R., and, in 1923, was awarded a four-year course of special training in all departments. In 1927 he became attached to the General Manager's office for special duties. The following year he became Assistant Secretary, Takoradi Harbour, Gold Coast, and, in 1929, served as Secretary to the Conference of General Managers of West African Railways. He was appointed Traffic Manager, Gold Coast Railways, in 1935, and transferred to the Kenya & Uganda Railways as Assistant Superintendent of the Line in 1938. In that capacity he was closely concerned with the movement of South and West African troops brought to East Africa in connection with the Abyssinian-Italian campaign. In 1942

Advisory Council and, during 1945-46, as Chairman of the Board of Scientific & Industrial Research. During his tenure of office in Palestine the capacity of the country's railways received maximum exploitation in the conveyance of vital war traffic, the capacity of the Kantara-Rifa Railways was expanded from less than one to twelve trains each way daily, and the Hejaz Railway was improved to serve the then new military post built at Akaba. In 1946 he established the Middle East Railways Conference Association comprising the Egyptian, Iraqi, Hejaz, Palestine, and Turkish Railways. He became a C.M.G. in 1945. Although Mr. Kirby was appointed Superintendent of the Line, E.A.R. & H., in November, 1948, he remained in Palestine until 1949, when the port and railway installations were handed over to the local authorities. In 1949 he was appointed Chairman of a Committee formed to report on development of the port of Dar-es-Salaam; in 1951 he became Assistant Commissioner for Transport, East Africa High Commission, in 1952,

neering Assistant, G.N.R., and, in August, 1914, he enlisted in the infantry, was awarded the M.C. in 1918 while in command of the R.E. Field Company, and demobilised with the rank of major in June, 1919. Mr. Train was appointed Personal Assistant to the Chief Engineer, G.N.R., in 1921. In this capacity he was responsible for introducing the Hallade track recorder and Hallade method of adjusting curves to this country. Three years later he became Assistant Industrial Agent in the Chief General Manager's office, and was placed in charge of the Works Section of that office in 1925. In 1927 he became Assistant to the Chief General Manager (Works), and, two years later, was transferred to Glasgow as District Engineer (Western Section), Southern Scottish Area. In 1934 he was appointed Assistant Engineer (Maintenance), Southern Area, and became Assistant Engineer of that area in 1937. He was appointed Engineer, Scottish Area, in October, 1938, and, in 1941, Engineer, Southern Area. In 1942 he was appointed Chief Engineer. Mr.

Train served on the Railway (London Plan) Committee between 1946 and 1947 and was appointed a full-time member of the Railway Executive in 1947. He has been a Member of Council of the Institution of Civil Engineers and Past President of the Permanent Way Institution. He was awarded the C.B.E. in the Birthday Honours List of 1952.

Mr. E. S. Hunt, Assistant General Manager, London Midland Region, British Railways, who, as recorded in our December 14 issue, retired at the end of last year,

to the Chief Goods Manager, and, in 1931, as a member of the L.M.S.R. Job Analysis & Inter-Departmental Relationship Committee. In 1932 he represented the Chief Goods Manager on the L.M.S.R. & L.N.E.R. Pooling Committee, and became Goods Station Working Assistant to the Chief Operating Manager in September the following year. In 1933 he represented the Chief Operating Manager on the L.M.S.R. & G.W.R. and L.M.S.R.-L.N.E.R.-G.W.R. Pooling Committees. During the 1939-45 war and in addition to his normal duties, Mr. Hunt acted as Liaison Officer for the

Mr. Leslie M. Sayers, who, as recorded in our December 14 issue, has been appointed Assistant General Manager, London Midland Region, British Railways, has been Divisional Operating Superintendent at Crewe since August, 1954. Mr. Sayers began his railway career on the former L.M.S.R. at Belper in 1927. From 1932 to 1935 he was Assistant District Signalmen's Inspector, Lancaster Castle and Heaton Norris. He was subsequently appointed Assistant District Controller, Peterborough (1935); Head Office Inspector (Freight Services), Derby, early in 1936; Assistant



*Mr. E. S. Hunt*  
Assistant General Manager, L.M.  
Region, 1949-56



*Mr. Leslie M. Sayers*  
Appointed Assistant General Manager,  
London Midland Region

joined the L. & N.W.R. in 1912. During the 1914-18 war he was first attached to the Outdoor Staff of the District Traffic Superintendent, Euston, and, in 1915, commissioned in the R.N.V.R. He was attached to the R.N.A.S. for six months, subsequently serving afloat with the 10th Cruiser Squadron. He returned to the L.N.W.R. in 1919 as Second Assistant in the Transit Section, Chief Goods Manager's Office, and, after 12 months in that capacity, was appointed to the outdoor staff of the Road Transport & Cartage Section of that office. On amalgamation he was appointed Head of the Development Section, and, early in 1924, became Head of the Station Working & Terminal Section, Southern Division. In 1927 he was appointed Outdoor Assistant to the Goods Operating Manager, and became Operating Assistant to that officer in the following year, in which he was later appointed Chief Goods Manager's representative on the L.M.S.R. & G.W.R. Closer Working Committee. In 1930 came appointment as Station Working Assistant

Chief Operating Manager with the Admiralty, War Office, and Air Ministry in connection with the loading and unloading arrangements at all Service department depots connected with the L.M.S.R. He was appointed District Goods Manager, London (Broad Street), in 1947, and became Assistant Chief Regional Officer, London Midland Region, in 1949. This position was subsequently re-designated Assistant General Manager. Mr. Hunt has held the following positions: Director of Ribble Motor Services Limited, North Western Road Car Co. Ltd., and Trent Motor Traction Co. Ltd.; Chairman of Dundalk, Newry & Greenore Railway Company; Member of Railway Clearing House Management Committee; Chairman of L.M.R. Diesel Light Weight Trains Committee; Chairman of L.M.R. Staff Suggestions Committee and Chairman of L.M.R. (London) Dramatic Society. He is a former Member of Council of the Institute of Transport. His family has a continuous service of 150 years with British railways.

Stationmaster & Goods Agent, Heysham Harbour (later in the same year); Stationmaster, Lancaster Castle (1940), and Head Office Inspector (Passenger Services), Crewe (1941). In 1942 Mr. Sayers was Acting Head Office Inspector, Chief Operating Manager's Office, Watford; Assistant Divisional Controller (Freight Services), Derby, in 1944; District Controller, Peterborough, in 1945; Assistant District Operating Manager, Leicester, in 1946, and District Operating Superintendent, Liverpool C.L.C., 1948. He became District Operating Superintendent, Hull, in March, 1950; District Operating Superintendent, Nottingham, in August, 1951, and, three years later, Divisional Operating Superintendent, Crewe.

To commemorate his 50 years of membership of the American Society of Mechanical Engineers, Mr. Gordon M. Campbell has been presented with the Society's medal. The presentation, which took place at the Rugby Works of the British Thomson-Houston Co. Ltd. (where Mr. Campbell was



**Mr. G. H. Hinds**Appointed Electronics Advisory Officer,  
British Transport Commission**Mr. George Dow**Appointed Assistant Commercial Manager,  
London Midland Region**Mr. H. Brown**Appointed Assistant Traffic Manager (Home),  
Metropolitan-Vickers Electrical Co. Ltd.

Director of Manufacture until he retired in 1946) was made on behalf of the American Society by Colonel P. H. Jones, Chairman of the Midland Branch of the Institution of Mechanical Engineers (Great Britain).

Mr. G. H. Hinds, O.B.E., B.Sc., who has been appointed Electronics Advisory Officer, British Transport Commission (see editorial this week), was educated at Dean Close School, Cheltenham, and entered the Army in 1914. He served with the Royal Artillery in France and in the Balkans during the 1914-18 war, and later entered the Artillery College (now the Royal Military College of Science), where he became Instructor in Gunnery & Mathematics in 1928. From 1933 to 1936 he was on regimental duties in India and the Sudan, and, after returning to this country, was appointed Ballistic Officer, Experimental Establishment, Shoeburyness, in 1937 and Range Table Officer, Ordnance Board, in 1938. He held a number of other military technical appointments in the U.K. during the period 1941-46, and, in 1946, was appointed Director of Weapons Research, Ministry of Supply, retaining this appointment when, in 1950, he retired from the Army with the rank of Brigadier. Mr. Hinds is a Fellow of the Physical Society, a Member of the Society of Instrument Technology, and of the Control Section, and is author or part author of a number of books on ballistics.

We regret to record the death on November 29, at the age of 66, of Mr. Adolf Brunner, Chief of the diesel traction department of Sulzer Bros. A.G., from 1920 until his retirement at the end of 1955. Mr. Brunner joined the Sulzer organisation in 1906, and in 1910 was transferred to the locomotive drawing office to work on the original Diesel-Sulzer-Klose 1,000 h.p. direct-drive locomotive. From that time onward he was associated entirely with railway oil engines and diesel traction. Among outstanding diesel motive power for which he was wholly or partly responsible were the Argentine 1,700 h.p. mobile power-houses and locomotive of 1933, the Roumanian 4,400 b.h.p. locomotive of 1938, the Siamese light-weight 735 and 960 b.h.p. locomotives of 1946-50, and the Commonwealth Railways 1,000 b.h.p. locomotives with 10½-ton axle

load of 1954. His greatest work in railway oil engines, the 12-cylinder twin-bank engine of 2,000/2,300 b.h.p., is now being installed in 35 locomotives in France and in 10 for British Railways. Mr. Brunner was a member of the Institution of Locomotive Engineers from 1947 until his death.

Mr. George Dow, F.R.S.A., M.Inst.T., A.I.Loco.E., who, as recorded in our December 28 issue, has been appointed Assistant Commercial Manager, London Midland Region, British Railways, from January 1 was educated at Watford Grammar School and Brighton College. He joined the L.N.E.R. as a junior clerk in 1927, and, after five years of experience in the Chief General Manager's Office at Kings Cross, became District Agent in the Commercial Advertising Department. In 1937 he was attached to the Advertising Manager's Headquarters for special duties connected with station improvements, and, in 1939, was appointed Information Agent, subsequently being designated Press Relations Officer. On nationalisation he was appointed Press Relations Officer, Eastern & North Eastern Regions. He became Public Relations & Publicity Officer to the London Midland Region in 1949, in which capacity he was responsible for the complete reorganisation of the department and the initiation of numerous developments in poster technique and improvements in public signs, train indicators, and publicity display equipment at stations. In 1955 he was appointed Chief Assistant (Sales) to the Chief Commercial Manager, Euston House, a post newly-created for the development of passenger and freight business on the London Midland Region.

Mr. A. F. Lucarotti, Assistant Construction Engineer, East African Railways & Harbours, has been appointed General Manager of North Borneo Railways.

Mr. J. H. Brebner, O.B.E., Public Relations Adviser to the British Transport Commission, was re-elected President of the Public Service Vehicle Advertising Committee at the Committee's meeting on January 1.

Mr. J. Follows has been appointed a director of the Tap & Die Corporation.

Mr. H. Brown, M.I.T.A., who, as recorded in our December 7 issue, has been appointed Assistant Traffic Manager (Home), Metropolitan-Vickers Electrical Co. Ltd., took up his position on September 24, 1956. Mr. Brown had previously served with Ferranti Limited: he joined that company in 1926, and for the last six years has been Transport Superintendent at their Avenue Works, Chadderton. He is a full member of the Manchester & District Traffic Association and of the Institute of Traffic Administration.

Mr. A. G. Evershed, A.C.A., Commercial Officer, has been appointed a Chief Officer of the London Transport Executive. The Executive has decided to revert to the former designation of Commercial Manager for this appointment and, as from January 1, 1957, Mr. Evershed's title has been Commercial Manager.

Mr. V. G. Baker has joined M. Samuel & Co. Ltd. as from January 1, 1957, as an Adviser.

Mr. G. N. Bridge has been appointed a director of Associated British Oil Engines (Export) Limited, Brush Export Limited, and National Oil Engines (Export) Limited, the export companies of the Brush Group, of which he remains London Manager.

The following staff changes are announced by London Midland Region, British Railways:—

Mr. F. O. Dann to be Assistant District Operating Superintendent, Crewe.

Mr. W. R. G. A. Haynes to be Assistant District Operating Superintendent, Manchester (Eastern Operating Area).

Mr. L. Williams to be Assistant District Motive Power Superintendent, Manchester South.

Mr. G. H. Peel to be Assistant District Motive Power Superintendent, Bescot.

Mr. R. C. J. Bray to be Assistant (Estate), Euston.

Mr. F. P. Swan to be Assistant (London District), Estate & Rating Surveyor's Department, Euston.

Mr. W. F. Holden to be Goods Agent, Manchester (London Road).

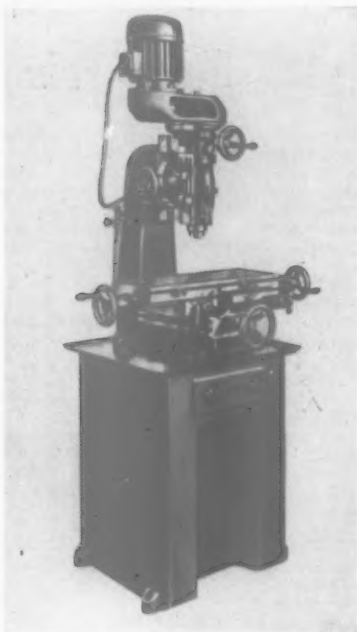
Mr. S. G. Clarke to be B.R. Overseas Freight Agent, Leadenhall Street.

## NEW EQUIPMENT AND PROCESSES

### Vertical Milling Machine

THE Swedish-built vertical milling machine, the Mattsson & Zetterland type VF 600, is designed to allow of the extensive use of carbide-tipped tools and is free from vibration at all speeds and also when heavy cuts are being made. This unit is claimed to be suitable for tool manufacture as well as piecework or mass production, as for instance, in railway mechanical workshops.

The main column and base are cast in one piece and the table and cross-slide beds are of sturdy construction and finished with wide sliding surfaces. The milling head swivels 45 deg. in two direc-



tions with automatic or manual spindle down-feed. Reduction gearing provides two spindle feed rates and the manual feed is by means of a hand wheel or lever. A total of 16 spindle speeds range from 70 to 2,060 r.p.m., while by disengaging the reduction gearing speeds from 220 to 4,560 r.p.m. can be obtained. The spindle is made from nitrided steel with ground splines and incorporates a Swedish and American 1½-in. standard taper for tool attachment. In its lower part the spindle runs in an adjustable, two-row cylindrical roller bearing, whereas the top portion is fitted with radial and thrust bearings.

Table measurements are approximately 1 ft. 11 in. × 9 in. It has longitudinal automatic and hand feeding with a maximum traverse of 1 ft. 1 in. and feed rates from ½ in. to 9½ in. per min. Accuracy of operation is ensured with the aid of blocks and gauges inserted into a gauging device on the side of the table. The manual crossfeed has an 8½-in. traverse. The ½-h.p. spindle head motor rotates at three speeds, 960, 1,400 and 2,800 r.p.m.

The machine weighs approximately ½-ton and overall measurements are: height 5 ft. 9 in., length 3 ft. 6 in., width 2 ft. 8 in. A range of accessories is available which make the machine suitable for tool making, production work or semi jig-boring.

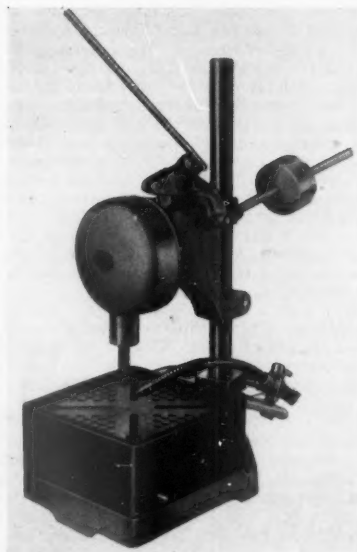
The price of the machine is £485 and delivery can be made in eight weeks. The agents in the U.K. are Adam Machine Equipment Limited, 4, Grange Street, St. Albans, Herts.

### Ultrasonic Drill

THE Mullard 50-W. ultrasonic drill is suitable for the drilling of hard and brittle materials as glass and ceramics, which are problems which coaching-stock component manufacturers, for example, may face. The machine produces a vertical reciprocating action and, used in conjunction with an abrasive slurry, makes possible all normal machining operations such as drilling, shaping, grinding and polishing, this being achieved by a light chipping action of the abrasive interposed between the faces of the cutting tool, which is normally of a soft material, and the workpiece.

Surface finishes of 8 to 10 micro-inches are easily obtainable, it is stated, and the size of holes may vary from 0.006 in. to ½ in. across, which may be of any shape. The drill assembly is 21 in. high × 8 in. wide × 13 in. deep and weighs 43 lb. complete with head unit.

An accessory which is claimed to further extend the performance and scope of the drill is a slurry pump and work-table which can be supplied separately to the drill unit. This pump unit provides a continuous and correctly concentrated flow of abrasive to the drill, obviating hand feeding, which is valuable for repetition work. The slurry unit incorporates an immersed impeller pump and a reservoir. The top



of the work-table is perforated to allow the abrasive to fall into the lower compartment easily where it is flushed by sprays and jets into a large-bore return pipe. In all cases, it is advised that water-abrasives at a concentration of approximately 100 to 1 and containing a rust inhibitor should be used. The dimensions of the table are 7½ in. × 7½ in. × 3½ in. high.

The home trade prices of the drill assembly with electric power unit is £70, pump and work-table units together £60, and pump only £52 10s. Delivery is ex stock for the drill assembly and one month for pump and work-table. The manufacturer is Mullard Limited, Torrington Place, London, W.C.1.

### Diesel Mobile Cranes

THE Rapier 6 & 7 Fast Standard mobile cranes, of 6 and 7½ tons capacity, facilitate handling of loads in confined spaces such as goods depots.

They travel on pneumatic tyres, four in



twin formation on the front driving axle and two on the steering axle which gives three-point stability. For travelling, the Perkins P.6 70-h.p. diesel engine is mechanically connected to a two-speed driving axle through clutch gearbox and reduction chain case. Road speeds up to 16 m.p.h. may be obtained with standard reduction gearing, but an alternative higher gearing which is available will give a maximum speed of 20 m.p.h.

Diesel-electric transmission operates the hoist and derrick, allowing regenerative braking to control the lowering of heavy loads at creeping speeds.

Turning circle radii are 13 ft. 5 in. and 14 ft. for models 6 Fast and 7 Fast respectively, with out-reach up to 11 ft. 4 in. and lift above ground up to 20 ft. 10 in. with standard jib. Short and long extensions may be fitted to give maximum out-reach and height of 22 ft. 2 in. and 30 ft. 2 in. A load indicator is fitted in full view of the driver showing the loads



which may be lifted at any position of the jib, and a patent automatic over-load warning device is fitted to both models as standard.

Stability of the cranes is stated to be maintained in all working conditions without props or jacks. If grossly overloaded the tail of the crane will rise instead of the load being lifted, giving time for the driver to correct this mistake before the crane becomes unstable. Control of both normal manoeuvring and lifting operations is from the driving position in the enclosed cab. There are simple reversing switches for the derrick and hoist motions and normal automobile controls for travel.

The basic prices of the cranes are: Model 6, £4,654; Model 7, £4,762. The manufacturer is Ransomes & Rapier Limited, Ipswich.

### Anti-Freeze Mixture

**A**N anti-freeze mixture, Amber anti-freeze 104, which both prevents and eliminates deposits of scale, removing also at the same time all types of corrosion in the cooling system, is now being produced. Corrosion in diesel cooling systems such as locomotive radiators has been found to be due not only to the corrosive constituents of the anti-freeze and of the water, but also to electrolytic action from many sources.

Amber A.F. 104 is a balanced solution of ethylene glycol as well as scale and corrosion preventive chemicals, whose action on negatively and positively charged ions completely solves this problem even at temperatures near boiling point, and which, it is stated, improves the anti-freeze effects of the ethylene glycols which it is believed, will prolong radiator life indefinitely. It is used in the same manner as ordinary commercial anti-freeze, and may be obtained in 5, 10, 20 and 45 gallon capacity drums.

The price is £1 8s. 9d. per gallon. Amber A.F. 104 is manufactured by Amber Industrial Chemical Treatments, 11A, Albemarle Street, W.1, a division of Amber Pharmaceuticals Limited.

### Diamond Particle Grinding Wheel Dressers

**T**OOl holder dressers suitable for use with all types of grinding wheels fitted to production machines, such as those used in some railway workshops, consist of a composition of diamond particles and boron carbide firmly bonded in a hard carbide matrix which is itself tough and abrasive. The principle is to combine the superior hardness of a diamond for dressing purposes with a reduction in cost. The advantages of this arrangement are that the quality depends not on any particular diamond but on the average of all the pieces, a more even performance and minimum loss through any defective particle.

The design allows the whole head to be utilised through the interlocking of the matrix with each diamond particle, thus preventing any waste of diamonds. In operation, heat generation is expected to be kept to a minimum as only light contact pressure is needed, and little, if any, special training in technique is necessary. Four standard designs are at present available, one of which, type D.1, is illustrated, but other types can be produced.

The lowest price of the present range is the type D.1 dresser which is £5 5s., and



delivery for all four types is ex stock. The manufacturer is Danite Hard Metals Limited, Carr Hill, Doncaster.

### Pneumatic Rock Drill

**S**UITABLE for tunnelling and similar applications and intended to replace the present model, is the Broomwade rock drill, type CB.268, some details of which were released for the first time at the Public Works & Municipal Services Exhibition, held last November in London. The CB.268 can be used both as a hand-held tool or with a drilleg, and can be supplied either in "blower" or "wet" types.

Drilling speed is an advance on previous

designs and with a 2½-in. bore × 2½-in. stroke, the drill delivers 2,000 blows per min. The drill, which can be arranged for 1-in. or ½-in. hexagon shank sizes, measures 26½ in. overall length with spade handle and 23½ in. with cross-bar handle. The net weight of the drill is 55 lb.

The home trade price is £85 15s. and delivery is one month. The manufacturer is Broom & Wade Limited, High Wycombe, Bucks.

### Lightweight Turbocharger

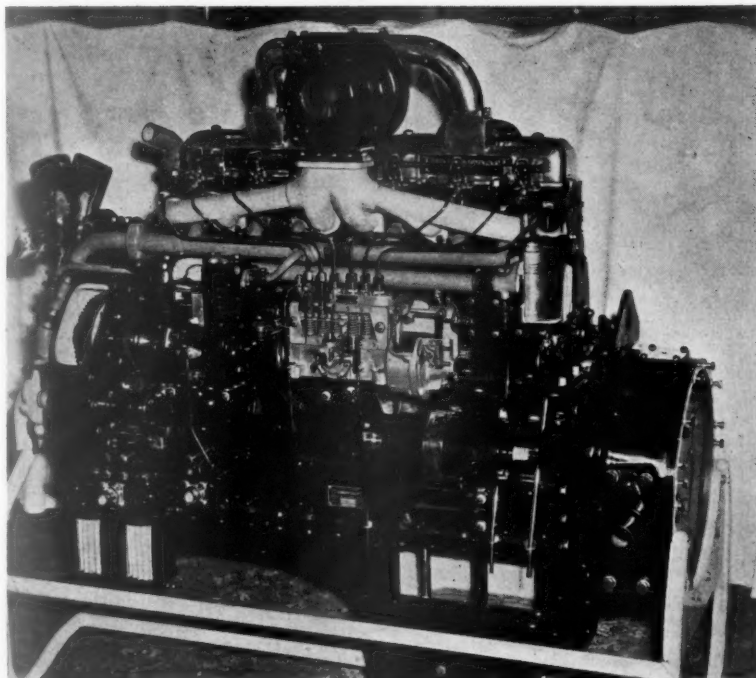
**T**HE Simms-Eberspacher turbocharger is suitable for road and rail type diesel engines in the range of 75-200 b.h.p. and will be available as a completely or partially, water or air cooled unit, depending on the cooling system of the engine to which it is to be applied. This can be made with the minimum of alteration. The illustration below shows a turbocharger fitted to a Thornycroft KRN 6/S engine.

The turbocharger is not driven in the usual manner by mechanical drive from the engine, but by a turbine; the latter uses residual energy in the engine exhaust gases, which increases when the engine is supercharged. Mounted on a common shaft, with the turbine, is a high-speed supercharging blower.

Maintenance is reported to have proved negligible on test; trail mileages were about 100,000 miles in most cases. The unit measures 9½ in. length × 11 in. dia. and weighs 37½ lb. The maximum permissible speed is 38,000 r.p.m.

Power increase of 30-50 per cent over the normally-aspirated output of any engine is stated to result from the fitting of the turbocharger, with reductions in specific fuel consumption of up to 9 per cent.

The unit is not yet in quantity production and the prices and delivery period are not yet determined. The manufacturer, in the U.K., is Simms Motor Units Limited, Finchley, London, N.2.



## Edinburgh-Glasgow Diesel Trains in Operation

*Existing steam service augmented by main-line diesel sets*

After private and public views of six-car formations at Edinburgh Waverley and Glasgow Queen Street stations on January 4, the Scottish Region of British Railways on January 7 introduced a diesel service between the two cities, using the main-line diesel multiple-unit sets of the type described in our issue of August 3, 1956.

At the moment, shortage of fuel oil prevents the whole of the Edinburgh-Glasgow passenger service being operated by diesel power, but the intention is to provide eventually a full diesel service except for those through trains which run south of Edinburgh to and from Glasgow. Within the next few months the diesel trains are to have buffet cars incorporated in the formations.

The basic train unit is a three-car set consisting of two power cars with intermediate trailer, each power car having two engines of 150 B.H.P. each.

Two sets are used coupled in multiple, giving a full-width cab at each end, and an engine output of 1,200 B.H.P. for an empty weight of 218 tons and a gross weight of about 240 tons, or about 5 B.H.P. per ton of gross weight.

A six-car set of the present formation has seating accommodation for 84 first class and 208 second class passengers, the former being arranged in compartments and the latter in saloons. Each railcar weighs 38 tons and a centre trailer 33 tons. The power equipment and controls were supplied by B.U.T. Limited, the underfloor engines being six-cylinder single bank.

### Improved Facilities

Diesel services at the moment run six days a week, and comprise the 8 a.m., 11.30 a.m., 12.30 p.m., 4.50 p.m., 7.30 p.m., and 10 p.m. departures from Glasgow Queen Street, and the 8.30 a.m., 9.30 a.m., 2 p.m., 4.30 p.m., 7.30 p.m., and 11 p.m. departures from Edinburgh Waverley. All

except the 11 p.m. ex Edinburgh operate on a 60-min. schedule for the 44½ miles. The 11 p.m. ex Waverley, which gives a Glasgow connection off the 4 p.m. "Talisman" from Kings Cross, runs via Falkirk Grahamston and takes 67 min.; all trains except the last mentioned stop at Edinburgh Haymarket.

In this initial stage the diesel trains are being used to augment the existing steam service, rather than to replace certain steam trains, so that a better service is now in force between the two cities, and caters for increased traffic resulting from the shortage of petrol affecting road transport.

### Servicing and Maintenance

Servicing and maintenance facilities are being provided at Leith Central to handle all 46 vehicles forming the trains needed for this service, and to look after further diesel railcars which are to be introduced into the Edinburgh area.

Addressing the guests at the Glasgow reception, Sir Ian Bolton, Chairman of the Scottish Area Board, and Mr. James Ness, General Manager of the Scottish Region, stated that further diesel trains would be incorporated in the Edinburgh-Glasgow service when the present fuel shortage ended, and that the ambition was to have an hourly diesel service, with a half-hourly service at peak periods.

### Further Diesel Workings in Scotland

This was the beginning of a Scottish Region plan to change over on a wide scale from steam to diesel working for passenger services. It was hoped to have the Edinburgh suburban services all diesel by the end of 1957; a diesel railcar service was to be introduced on the Comrie-Crieffe line during the summer; the Glasgow-Ayr line was expected to have its first diesel services in 1958, and plans were afoot to have steam traction abolished from that route by 1964. Work had also begun on

the electrification of the Glasgow suburban routes, and the Helensburgh-Airdrie line was expected to have full electric working in 1960.

At Edinburgh, the guests were received by Sir Hugh Rose, a member of the Scottish Area Board, who spoke in similar terms.

## Signalling Modifications for Southend Electrification

Electrification at 1,500 V. d.c. of the British Railways, Eastern Region, line from Shenfield to Southend Victoria, described last week, has made it necessary to isolate the signalling equipment from the effects of stray current from the traction supply. For this purpose the Siemens & General Electric Railway Signal Co. Ltd. has supplied and installed 169 a.c. track circuits, of which 111 are double-rail with impedance bonds; also the associated power cable for 650 V. a.c. and four telecommunication cables—one eight-pair and three single-pair.

All existing searchlight signals have been adapted for a.c. control through transformer-rectifier units, and similar arrangements have been made for d.c. lever locks at ground frames. Approximately 115 apparatus cases and 800 plug-in relays of various types have been provided. New relay racks have been installed at Southend and Wickford signal cabins, both of which have been re-wired.

It is regretted that, through a clerical error, mention was not made in the article in our January 4 issue that the contractor for the signalling work in connection with the Shenfield-Southend electrification was the Siemens & General Electric Railway Signal Co. Ltd.

## Cheap Rail Travel in 1957

British Railways are to re-introduce this year two popular cheap travel facilities—mid-week period return holiday tickets and "Starlight Special" excursions between London and Edinburgh and Glasgow.

Cheap mid-week holiday tickets offering a saving of 4s. in the £ on the ordinary second class return fare will be issued from May 7 to October 31 between any pair of stations in Britain 100 miles or more apart. Tickets, second class only, will be issued for travel on Tuesdays, Wednesdays, and Thursdays, and will be available for return on the Tuesday, Wednesday, or Thursday of the following week or the week after.

During the same period mid-week bookings will be available to the Channel Islands and, from May 7 to September 26, to ports and selected stations in Ireland.

### Overnight Travel

"Starlight Special" excursions for overnight travel between London and Edinburgh and between London and Glasgow, offering a guaranteed seat at a fare of 80s. for the round trip, are to be run, beginning on the night of April 18 from London and on April 19 from Scotland, thereafter on every Friday night in each direction until September 20.

Passengers may return by special train on the Saturday week or Saturday fortnight after the date of departure. Light refreshments will be available on the trains.

Advance bookings may be made at the



*Main-line diesel set leaving Edinburgh Waverley for Glasgow Queen Street, with the (British Transport) North British Hotel in background*

principal railway stations and railway ticket agencies in the London area; and in Glasgow and Edinburgh from January 3, except for Glasgow Fair week and Edinburgh Trade Holidays, for which bookings will open on January 10.

### G.E.C. Work for Railways in 1956

The 32 electrical equipments ordered from the General Electric Co. Ltd. for 1,500-V. d.c. four-coach multiple-unit trains on the Liverpool Street-Southend Victoria service of the Eastern Region were delivered during the year. Some of the trains worked for several months on the Chelmsford service before public traffic to and from Southend began on December 31.

Deliveries are being made of the equipments for 57 three-coach sets for the Euston-Watford services, London Midland Region. For this third- and fourth-rail, 600-V. d.c. electrification, special shoe gear has been designed in which rubber is used both as a noise-damping and a springing medium. The 32 motors, with a continuous rating of 80 h.p., ordered by the London Transport Executive for new prototype tube trains were in course of manufacture during the year.

A repeat order was received from the British Transport Commission for 45 power equipments with Lister-Blackstone engines for standard 350 h.p. diesel-electric shunters similar to the 15 previously supplied. Ten 1,000 h.p. main line and ten 800 h.p. branch line diesel-electric locomotives for British Railways are under construction at the works of the North British Locomotive Co. Ltd. The G.E.C. power equipments, incorporating respectively N.B.L.-M.A.N. and Davey Paxman engines, are designed so that motor field control is effected automatically between full and weak field, both forward and backward, on any engine power notch, thereby ensuring the fullest utilisation of engine power over a very wide range of locomotive speeds.

### Supplies and Distribution

A special section to deal with overhead line equipment for railway electrification has been formed in the Overhead Lines Department of the Pirelli-General Cable Works Limited at Eastleigh. As a result of an agreement recently concluded between Pirelli-General and Brown-Boveri A.G. of Mannheim, there will be free exchange of technical information between the two companies, and the experience gained by Brown, Boveri in railway electrification in many parts of the world will be placed at the disposal of Pirelli-General engineers.

The installation of 33-kV. oil-filled cable for the Southern Region change-of-frequency scheme has continued, and an experimental length of some three miles with corrugated aluminium sheathing has been laid between Wimbledon and St. Helier sub-stations.

### Signalling

Home contracts were received during the year by the Siemens & General Electric Signal Co. Ltd. for a route-relay interlocking of 64 routes at Temple Mills East, Eastern Region, and for colour-light signalling at Huddersfield Station, North Eastern Region. The Temple Mills contract includes the installation of two mechanical ground frames and the supply and installation of a 30-lever mechanical

frame at Manor Yard box. On the Shenfield-Chelmsford and Southend electrification extensions, S.G.E. provided a.c. track circuits and carried out other work necessary for immunising the signalling from the d.c. traction supply. Colour-light signalling was brought into operation on some five miles of the Scottish Region low-level lines running east and west from Glasgow Central Station.

In Rhodesia the C.T.C. installation on the Livingstone main line is now in operation on the 70 miles between Ngamo and Inyantue. From the South African Railways a contract has been received for relay interlocking and automatic colour-light signalling on new lines serving native townships in the Germiston-Angus area of the Rand, east of Johannesburg.

### British Railways Arts and Crafts Exhibition

The British Railways Staff Association is to hold its second inter-Regional exhibition of arts and crafts at Brunswick House, Wandsworth Road, Vauxhall, London, from January 10 to 14.

The exhibition will be divided into seven main sections, covering painting; needlework; woodwork and carving; toys; models; photography (this section will include coloured transparencies—a new feature), and miscellaneous decorative articles for home use.

Nearly 400 entries, all of them chosen from exhibits previously shown at regional exhibitions, have been received from staff of all grades throughout British Railways, and from members of their families.

### Challenge Shield

A challenge shield awarded annually to the Region gaining the most points in the exhibition (present holders are the Southern Region) will be presented on January 14 by Lady Robertson, wife of Sir Brian Robertson, Chairman of the British Transport Commission; she will also present plaques to the winning exhibitors and runners-up in each class.

The exhibition will be open to the public each weekday from 10 a.m. to 9 p.m. and on the Sunday from 2 p.m. to 7 p.m., admission free.

### Staff and Labour Matters

#### N.U.R. Wage Claim

Delegates of the London District Council of the N.U.R. at a meeting on January 8 instructed the national executive of the union to stand firm on the demand for a 10 per cent increase in rates of pay for railway salaried and conciliation staff.

#### London Busmen's Pay

Delegates representing London Busmen accepted on January 8 the London Transport Executive offer of an increase of 7s. 6d. a week for drivers and conductors and 7s. 4d. for maintenance staff. The increase of 7s. 6d. applies both to Central and Country busmen employed by London Transport and the new scales operate from January 9, although it is understood that there will be a period of retrospective payment amounting to 10 weeks.

In addition to the new rates of pay, improvements have been agreed in the payment made to London busmen for Saturday afternoon work.

### Contracts and Tenders

An order has been received by Hurst, Nelson & Co. Ltd. from Sudan Railways for 10 bogie benzine tank wagons of 20 tons capacity and 20 similar wagons of 25 tons capacity.

It is reported from Montreal that General Motors Diesel Limited, a Canadian subsidiary of General Motors Corporation, U.S.A., has obtained an order for 25 diesel-electric locomotives from Companhia Mogiana de Estradas de Ferro, Brazil. The order is said to be worth some \$5,000,000 and deliveries are to start before June this year.

The Indonesian State Railways have ordered 35 950-h.p. G8 diesel-electric locomotives from General Motors Corporation, U.S.A. Deliveries are to start in the near future. The locomotives are geared for speeds up to 110 k.p.h. and are to be used for passenger and freight haulage in Java. They are also suitable for shunting operations. Most of the locomotives will run on the 3-ft. 6-in. gauge lines west of Djakarta and east of Soerabaja.

British Railways, North Eastern Region, announce that the following contracts have been placed:—

Springbank Quarry Co. Ltd., Airdrie: supply of precast concrete units, Boston F. & J. Watkinson, Bradford: painting and decorating, 39, Wellington Street, Leeds

Dorman Long (Bridge & Engineering) Limited, Luton: reconstruction of east end span of Bridge No. 62, Bradford (Croft Street)

E. Davis (Fixers) Limited, York: repairs to roof over turntables 1 & 2 north side, Motive Power Depot, Beville Hill

G. Cohen Sons & Co. Ltd., Stanningley: one punching and shearing machine, Wagon Works, Shildon

T. E. Cundy & Sons Ltd., Leicester: cleaning and painting, Erecting Shop, North Road Loco. Works, Darlington

British Railways, Eastern Region, announce that the following contracts have been placed:—

R. Ridd & Son (Contractors) Ltd., 153, Billet Lane, Hornchurch, Essex: cleaning and painting warehouses, goods sheds, offices, messrooms, and stores, at Goods Yard (area 3A), King's Cross

Cleveland Bridge & Engineering Co. Ltd., P.O. Box No. 27, Darlington: reconstruction of superstructure of underline bridges No. 1996, over Occupation Road, and No. 1997 over Turkey Street, between Churchbury and Forty Hill

J. & J. Dean Ltd., Ruckholt Works, Ruckholt Road, Leyton, E.10: reconstruction of platform buildings, awnings, staircases, ticket office and certain ancillary works at Leytonstone High Road Station

John Boyd & Co. (Engineers) Ltd., Annan, Dumfriesshire: supply delivery and installation of one 70 ft. diameter electrically operated locomotive turntable at new marshalling yard, Ripple Lane, Barking

A. Jackaman & Son Ltd., Highfield, 9, Bath Road, Slough, Bucks: reconstruction of superstructures of overbridges 1919, 1920, 1921, 1922, 1925 and 1935 between Hackney Downs and Bruce Grove Stations

Higgs & Hill Ltd., Crown Works, South Lambeth Road, London, S.W.8:



reconstruction of superstructures of over-bridges Nos. 1379, 1380, 1381, 1386 and 1387 between Hackney Downs and Clapton Stations

Charles R. Price, Barnsley Road, Doncaster: reconstruction and raising of platforms serving up and down fast lines and part of ramp leading thereto from subway at Swinton Town Station

Mitchell Engineering Ltd., The Bridge, Peterborough: repairs to Coaling Plant, Whitmoor

Caffin & Co. Ltd., Maple Cross, Rickmansworth: reconstruction of underline bridge No. 2061 at 29m. 18c. over River Rib between Hadham and Standon

A. Jackaman & Son Ltd., Highfield, 9, Bath Road, Slough: alterations to superstructures of overbridges Nos. 44, 50, 53, 58, 75, 76, 89 and 90 between Upminster and Pitsea

Cable Jointers Ltd., 229, High Street, Acton, W.3: supply, delivery and installation of cables and electrical apparatus at carriage sidings, Thornton Fields, Stratford

Samuel Butler & Co. Ltd., Albion Works, Stanningley, Nr. Leeds: repairs to underline bridge No. 1350 between Cambridge Heath and London Fields Stations, Wilton Road underline bridge No. 1366, Spurstone Road underline bridge No. 1371, and underline bridge No. 1363 between London Fields and Hackney Downs Stations; underline bridge No. 1372 and underline bridge No. 1375 at Hackney Downs Station; underline bridge No. 1888 between Clapton and St. James' Street Stations; overbridge No. 7 and Primrose Street overbridge No. 8 between Liverpool Street and Bethnal Green Stations; underline bridge No. 1895 between St. James' Street and Hoe Street; underline bridge No. 22 between Stepney East and Bromley Stations; underline bridge No. 32 between Bromley and West Ham Stations; overbridge No. 46 between Plaistow and Upton Park Stations; overbridge No. 53 at Upton Park Station; overbridges No. 54 and No. 56 between Upton Park and East Ham Stations; and repairs to and lifting by approximately 6 ft. public overbridge No. 1384 at Clapton Station.

The Director-General of Supplies and Disposals, New Delhi, invites tenders for cranks as follows:—

68 cranks, eccentric arm for YP & YG locos as per N.E. Rly. Drg. No. LM/144 alt. nil (DGS & D No. 13199) & IRS spec. No. M26/53, steel class X. Delivery is required by March, 1957, and tenderers should give the earliest monthly schedule of deliveries that they guarantee to adhere, showing a definite date from which deliveries will be commenced. Tenders should be addressed to the Director-General, Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi, quoting reference No. P/SRI/16734-G/II. The closing date is January 16, 1957. Forms of tender are only available for purchase in India from: (1) Deputy Director-General (Supplies), Directorate General of Supplies & Disposals, New Delhi; (2) Director of Supplies and Disposals, Bombay or Calcutta; (3) Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and

return them duly completed as soon as possible on the basis of advance quotations already submitted. A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S.2555/56/Rly./BN, and the drawing can be seen at the office of Messrs. Hodges, Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

The Director-General of Supplies and Disposals, New Delhi, invites tenders for cast-steel axle boxes, cast-steel fire doors and levers combination.

Delivery is required as soon as possible, and tenderers should give the earliest monthly schedule of deliveries that they guarantee to adhere, showing a definite date from which deliveries will be commenced. Tenders should be addressed to the Director-General, Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi, quoting reference No. P/SRI/18316-G/II. The closing date is January 22, 1957. Forms of tender are only available for purchase in India from: (1) Deputy Director-General (Supplies), Directorate General of Supplies & Disposals, New Delhi; (2) Director of Supplies & Disposals, Bombay or Calcutta; (3) Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted. Details of the requirements can be obtained from the Director-General, India Store Department, Government Buildings, Bromyard Avenue, Acton, London, W.3, quoting reference No. S.2599/56/Rly./BN. A copy of the tender form can be examined at the above address on application to the "CDN" Branch and the drawing can be seen at the office of Messrs. Hodges Bennett & Company, 59/60, Petty France, Westminster, London S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

The Director-General of Supplies and Disposals, New Delhi, invites tenders for side liners as follows:—

432 side liners for coupled axle box (magnese steel) to Drg. No. Ex. GIPWA-1795 alt. 1 (D.G.S. & D. No. 13183) material specn. as per Drgs.

Delivery is required by March 31, 1957, and tenderers should give the earliest date of delivery that they guarantee to adhere. Tenders should be addressed to the Director General Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi, quoting reference No. P/SRI/16714-G/I. The closing date is January 15, 1957. Forms of tender are only available for purchase in India from: (1) Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; (2) Director of Supplies & Disposals, Bombay or Calcutta; (3) Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided

always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted. A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S.2556/56/Rly./BN, and the drawing can be seen at the office of Messrs. Hodges Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

The Director-General of Supplies and Disposals, New Delhi, invites tenders for axlebox shells as follows:—

58 axlebox shells 10 in. x 5 in. JNL x 7½ in. x 1 in. groove, C.S. (machined) with liners and face plates to CME's Drg. Nos. 11935 (C&W) alt. 1 and 11576 (I.S.D. Nos. 9221/1 & 8853/2) and I.R.S. specn. No. R7/49

Delivery is required by March 31, 1957, and tenderers should give the earliest date of delivery that they guarantee to adhere. Tenders should be addressed to the Director General, Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi, quoting reference No. P/SRI/16740-G/I. The closing date is January 18, 1957. Forms of tender are only available for purchase in India from: (1) Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; (2) Director of Supplies & Disposals, Bombay or Calcutta; (3) Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted.

A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S.2592/56/Rly./BN, and the drawing can be seen at the office of Messrs. Hodges Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

The Director-General of Supplies and Disposals, New Delhi, invites tenders for buffer parts as follows:—

35 Eal/NS: buffer base plate to I.R. Part Drg. LBD/653 alt. nil & to IRS. specn. No. M-5/54 steel class II

35 Eal/NS: buffer casing to I.R. Part Drg. No. L/BD650 and L/BD650R alt. nil & to IRS. specn. No. M-2/48 C. steel class A grade I

35 Eal/NS: buffer plunger to I.R. Part Drg. No. L/BD648 and 648R alt. nil & to IRS. specn. No. M-2/48 C.S. CI. A grade I

35 Eal/NS: buffer base to I.R. Part Drg. No. L/BD652 and 652R alt. nil & to specn. No. M-2/48 C.S. CI. A grade I

Delivery is required by July 1, 1957, and tenderers should give the earliest monthly schedule of deliveries that they guarantee to adhere, showing a definite date from which deliveries will be commenced. Tenders should be addressed to the

Director General, Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi, quoting reference No. SRI/16770-G/III. The closing date is January 29, 1957. Forms of tender are only available for purchase in India from: (1) Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; (2) Director of Supplies & Disposals, Bombay or Calcutta; (3) Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted. A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S.2578/56/Rly./BN, and the drawing can be seen at the office of Messrs. Hodges Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

The Director-General of Supplies and Disposals, New Delhi, invites tenders for drawbar face plates as follows:—

1406 drawbar face plate for K.C. wagon to Ex. LB N.R. CME's Drg. No. 7689B, Item B (DGS & D No. 6502) to IRS No. M.5/48 class II (class Eal/ Card No. 41/05/0160)

Delivery is required as soon as possible and tenderers should give the earliest monthly schedule of deliveries that they guarantee to adhere, showing a definite date from which deliveries will be commenced. Tenders should be addressed to the Director-General, Supplies & Disposals (Section SRI), Shahjahan Road, New Delhi, quoting reference No. SRI/16161-E/III. The closing date is January 29, 1957. Forms of tender are only available for purchase in India from: (1) Deputy Director-General (Supplies), Directorate General of Supplies & Disposals, New Delhi; (2) Director of Supplies & Disposals, Bombay or Calcutta; (3) Deputy Director of Supplies & Disposals, Madras. If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted. A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S.2517/56/Rly./BN, and the drawing can be seen at the office of Messrs. Hodges Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

The Director General of Supplies and Disposals, New Delhi, invites tenders for buffer yokes as follows:—

1,000 buffer yoke female (EBI/168-19/GOC), Jones patent type without

slack gathering gear 10 tons (C & W) spare shank, to Drg. No. 26478/12 Fig. B. (DGS & D No. 13254) & L.R.S. Spean. M3/49 with Corrig No. 1 of 3/54 (steel class I)

Immediate delivery is required, and tenderers should give the earliest monthly schedule of deliveries that they guarantee to adhere to, showing a definite date from which deliveries will be commenced. The address to which bids should be sent is the Director General, Supplies & Disposals (Section SRI), Shahjahan Rd., New Delhi, India. The reference No. SRI/16773-G/III should be quoted. The closing date is January 30, 1957. Forms of tender are only available for purchase in India from the Deputy Director General (Supplies), Directorate General of Supplies & Disposals, New Delhi; Director of Supplies & Disposals, Bombay or Calcutta; Deputy Director of Supplies & Disposals, Madras.

If the date for the receipt of tenders does not allow sufficient time for tenderers to obtain tender forms from India, they may submit their quotation to India in their own letter form or by telegram provided always that all essential particulars are given and further provided they simultaneously apply for the tender forms and return them duly completed as soon as possible on the basis of advance quotations already submitted.

A copy of the tender form can be examined at the India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, on application to the "CDN" Branch quoting reference No. S.2591/56/Rly./BN., and the drawing can be seen at the office of Hodges Bennett & Company, 59/60, Petty France, Westminster, London, S.W.1, from whom copies may be obtained, if required, at a fixed price per sheet.

**ACCIDENT AT WELWYN GARDEN CITY.**—On January 7, in slightly misty conditions, the 7.10 p.m. (Sunday) train from Aberdeen to Kings Cross ran into the rear of the 6.18 a.m. suburban train from Baldock to Kings Cross about a mile south of Welwyn Garden City station. Both trains were on the up main line. One person was killed and 26 passengers injured, five of them seriously. Two rear coaches of the suburban train were derailed and overturned, as was the express locomotive No. 60520, an A2/3 Pacific *Owen Tudor*. Five of the 11 vehicles of the Aberdeen train were completely derailed and the leading vehicles overturned. A bogie of the sixth vehicle was derailed. The two rear coaches of the local train were extensively damaged. All vehicles involved in the mishap had steel underframes and buck-eye couplings which prevented telescoping. The up main line was extensively damaged and the up slow to a lesser degree. All trains were diverted via the Hertford line. Shuttle services between Hatfield and Kings Cross; Hatfield and Welwyn; and Welwyn and Hitchin were brought into operation to convey passengers between these points. There was some delay to trains in both directions because of the diversions. All vehicles were rerailed by 12.15 a.m. on Tuesday morning and were cleared from site by an hour later. Normal working, apart from speed restrictions, was in operation by 7.30 a.m. A private Eastern Region enquiry is being held today, January 11, and the Ministry of Transport enquiry is to be held on January 18.

## Notes and News

**Malayan Railway Administration.**—Applications are invited from civil engineers for employment as resident engineers with the Malayan Railway Administration. Appointments will be on three year contract. See Official Notices on page 60.

**Heating Engineering Assistants Required.**—The Middlesex County Council, County Architect's Department, has vacancies for heating engineering assistants required for preparation of schemes for heating and hot water installations. See Official Notices on page 60.

**Engineering Assistant Required.**—London Transport requires an engineering assistant to inspect ferrous and non-ferrous materials delivered for immediate use or after processing, and to inspect newly delivered or manufactured equipment. See Official Notices on page 60.

**Vacancy for Assistant Works Manager.**—Applications are invited for the post of assistant works manager, Gold Coast Railways, to assist the works manager in responsibility for maintaining heavy workshop repairs to locomotives, cranes, auxiliary plant and other mechanical equipment. See Official Notices on page 60.

**Vacancies on the Central and Southern Railways of Peru.**—Vacancies exist on the Central Railway of Peru for a temporary officer, stores vocabulary; an assistant engineer, between 24 and 30 years of age; an assistant mechanical engineer, between 23 and 30 years of age; and an assistant engineer, between 24 and 30 years of age, is required for the Southern Railway of Peru. See Official Notices on page 60.

**London Midland Region Excursion Traffic.** There were 4,500,000 bookings by special day and half-day excursions in the London Midland Region in 1956, while 30,000,000 special cheap day tickets by ordinary trains were issued. Nearly 8,000 special excursion trains were run. Over 69,000 weekly runabout tickets were sold for unlimited travel in seven holiday areas in the Region. The Lancashire Coast area was the most popular, with over 30,000 bookings.

**Port Extension in Nigeria.**—The Nigeria Office in London announced on December 21 that the Government of the Federation of Nigeria has awarded a contract to Taylor, Woodrow (West Africa) Limited for a wharf extension at Port Harcourt, Nigeria. The work includes the construction of three additional deep water berths and is expected to cost £3,500,000. It should be completed by June, 1960. Messrs. Coode & Partners, London, are the consulting engineers.

**New Concession for British Railways Season Ticket Holders.**—As from January 1, holders of British Railways season tickets issued for a month or longer who are prevented by illness from making use of the tickets, are given a cash refund, or extension of the period of travel, if tickets are relinquished for a minimum period of 14 consecutive days. Previously the minimum period was 21 days and the concession granted in respect only of tickets issued for more than one month. Applications for refund or extension must be supported by a doctor's certificate. The

refunds or extensions is equivalent to 75 per cent of the value of the tickets for the period of relinquishment.

**Aluminium Development Association Publications.**—The list of publications mentioned on page 753 of our issue of December 28, 1956, is separate from the "Directory of Members" which latter does not give the list of publications but only particulars of the member companies.

**Liverpool Overhead Railway Traffic.**—The traffic return of the Liverpool Overhead Railway for the last week of its operation, that ending December 30, shows receipts of £2,333, an increase of £46 over the corresponding week of 1955. Total receipts for the year were £156,862, a decrease of £2,687 compared with the previous year.

**Travel Agents' Award to British and Irish Railways Organisation in N. America.**—Associated British & Irish Railways Incorporated, which represents in Canada and the U.S.A. the transport and hotels interests of the British Transport Commission and the Irish railways, has been awarded the Travel Agents' Guild of America Railroad Award, "in recognition of meritorious service and outstanding contribution rendered to the travel industry."

**Presentation to Mr. Edgar Hunt.**—The accompanying illustration shows Mrs. Hunt and officers past and present of the former London Midland & Scottish Railway and of British Railways, London Midland Region, at the presentation to Mr. Edgar Hunt, Assistant General Manager of the Region, of a gold watch on the occasion of his retirement. In the group are (left to right):

*Front row:* Messrs. T. W. Royle, R. A. Riddles, E. S. Hunt, Mrs. Hunt, Mr. F. A. Pope.  
*Next row, standing:* Sir John Elliot, Messrs. G. L. Darbyshire, David Blee, J. W. Watkins, S. G. Hearn, A. E. Hammett.

*Back row:* Messrs. A. M. MacLeod, G. J. Harris, J. F. Harrison, E. W. Arkle, L. W. Cox, H. Randle, J. Taylor Thompson, J. K. Abson, S. Williams, Captain J. D. Reed, Dr. G. E. Graves Peirce, Mr. S. T. Clayton.

*Standing at back:* Messrs. A. E. C. Dent, H. Aidley.



Mrs. Hunt and officers past and present of the L.M.S.R. and London Midland Region who attended the presentation to Mr. Edgar Hunt on the occasion of his retirement

**Prefabricated Bridge Reconstruction.**—In the article on page 725 of our issue of December 21, 1956, the weight of the main bridge unit was incorrectly stated to be 2 tons. This should have read 72 tons.

**Rhodesia Railways Trust Dividend.**—The final dividend of Rhodesia Railways Trust is 10 per cent, as against 8½ per cent for 1954-55, increasing the final dividend for the year ended September 30, 1956, to 14 per cent from 12½ per cent. The net profit rose to £202,441 from £180,718, after tax of £155,929 (£146,681).

**L.M.R. Freight Link Up with B.R.S.**—To save oil fuel, London Midland Region special overnight goods trains have been running nightly since last Monday between Cheadle Heath, Manchester, and Hendon and between Golborne, Lancs., and Glasgow, for British Road Services traffic. B.R.S. bring lorry-loads into the depots, and their staffs, under British Railways supervision, transfer the goods to railway wagons; other British Road Services staff unload at destinations and deliver to consignees.

**Associated Commercial Vehicles Group.**—The report of Associated Commercial Vehicles Limited, which will be presented at the annual general meeting on January 23, states that the group profit after taxation for the year ended September 30, 1956, is £508,435, compared with £655,559 for 1955. After amounts retained for subsidiary companies the profit to be dealt with by the company is £489,270 (£580,331), £150,000 (£250,000) being allocated to the general reserve. A final dividend on ordinary stock of 12½ per cent (12½ per cent), less tax, is proposed, making a total distribution of 22½ per cent (22½ per cent), less tax, for the year. The total dividend will account for £270,070, as last year.

**London Midland Region Safety Drive Award.**—A cheque for £50 was presented recently by Mr. David Blee, General Manager of the London Midland Region, to Senior Parcels Porter R. Hignett, of Liverpool Exchange Station, who was the only competitor to place in correct order

of merit 12 pictorial posters on the prevention of accidents which are exhibited in the various depots of the London Midland Region. Some 9,000 members of the staff entered for the competition which was launched by the Region as part of a drive to reduce accidents to staff while at work.

**Collision on General Roca Railway.**—The heading "Argentina" was omitted in error on page 9 of our January 4 issue. The General Roca Railway was formerly known as the Buenos Ayres Great Southern Railway.

**Pant Glas Station Closed.**—The London Midland Region announces that Pant Glas station, between Pen-y-Groes and Brynkrir, on the Bangor-Caernarvon-Afonwen line, was closed on January 7. Passengers should book to Pen-y-Groes or Brynkrir, whence buses are operated by Crossville Motor Services. Parcels and passenger train merchandise are dealt with at Brynkrir.

**Stewarts and Lloyds Limited Results.**—The balance sheet for the year ended September 29, 1956, to be presented at the annual general meeting of Stewarts and Lloyds Limited on January 29, shows that the group current assets totalled £52,828,000 compared with £44,227,000 for the previous year. Current liabilities were entered at £24,336,000 (£21,698,000), and net profits were £8,517,000 (£7,060,000). Ordinary distribution will be held at 17½ per cent, absorbing £1,006,000.

**United Railways of Havana.**—The joint liquidators of the United Railways of the Havana & Rigla Warehouses state that, no appeal having been lodged against the judgment of the High Court, given on December 4, they are now making the interim payments of £40 on each £100 of 5 per cent second income loan stock and £4 10s. on each £100 of consolidated stock. The court, at the liquidators' request, has granted a further adjournment until February 20 to enable the liquidators to file further evidence on Cuban law regarding the proceedings instituted by the equipment trust trustee.

**Increased Efficiency of Petrol Engines.**—At a press conference at the Waldorf Hotel, Aldwych, London, W.C.2, on January 8, Mr. L. A. C. Lawler, Managing Director, Fuel Conservation Limited, of 132-4 Fleet Street, London, E.C.4, released details of what is known as the G Unit, which, when fitted between the carburettor and manifold of a petrol engine, will provide economy in fuel consumption up to 25 per cent. Provided the carburettor is properly adjusted, no alterations are necessary after the equipment is fitted. It may be necessary to make a small adjustment to the throttle stop. There are no moving parts, and once fitted will last the life of the car. The equipment is manufactured by L. & R. Engineering Limited, Whades Works, Duke Street, Littlehampton, Sussex.

**Institute of Welding Evening Lecture Course.**—Because of the success of the evening lecture course on the detail design of welded structural steelwork, held during the period October 3 to December 5, 1956, when 300 designers and draughtsmen applied for the 125 places available, a repeat course has been organised by the Institute of Welding. This begins on January 16, 1957, and again more applications than the available places have been received. The need for this type of instruction revealed by the Institute's original



survey of the structural steelwork industry has been confirmed, and further courses are being planned in various industrial centres throughout the country. The first of these further courses is being organised in Birmingham from February 25 to May 6, 1957. The number of places available is strictly limited. The address of the Institute is 29, Park Crescent, London, W.1 (tel. Langham 7488/9).

**Extension of Coal Compartment Boat System Urged.**—Among recommendations made to the Committee on Coal Distribution Costs by the Inland Waterways Association recently, was the extension of the compartment boat system for coal-carrying, not only in Yorkshire but on other heavily-used waterways, possibly in a modified form. The Association points out that coal is one of the most suitable commodities for carriage by waterway, provided modern machinery is available for handling it. In 1955, however, 168,008,062 tons of coal was carried by rail, 34,926,715 by road, and only 4,754,114 tons by inland waterways. Other proposals include the development of containers to enable light cranes and hoists to unload coal from boats conveniently, or a small compartment boat for use on narrow waterways. All inland waterways, it suggests, should be placed under the control of a National Waterways Conservancy and such a body should have Conservators representing all waterway interests.

**Camping Coaches on Show.**—Holiday-makers considering a British Railways camping coach holiday this year are being given a preview of the coaches at many stations in the Western Region in January and February. The Western Region coaches, which are being exhibited fully equipped, provide accommodation for eight persons, and are supplied with bedding, all kitchen-ware, and other equipment necessary for a holiday. Charges range from £7 to £11 10s. a week, according to season. The coaches are being shown this week at Paddington, Kidderminster, Plymouth North Road, Swansea High Street, and Pontypool Crane Street. On January 14-18 they will be at Slough, Birmingham Snow Hill, Bristol Temple Meads, Cardiff Queen Street, and Newport High Street. On January 21-25 they will be at Marylebone, Wrexham General, Cirencester Town, Pontypridd, and Tredegar. A coach will be shown at Oswestry from January 28 to February 1.

**Stephenson Locomotive Society Midland Area Dinner.**—Over 80 members and guests were present at the dinner held at the Imperial Hotel, Birmingham, on January 5, to mark the 10th anniversary of the establishment of the Midland Area of the Stephenson Locomotive Society. Mr. A. J. Boston, Chairman of the Society, presided, and the principal guest was Mr. R. F. Hanks, Chairman of the Western Region Area Board, British Transport Commission. In proposing the toast of the Stephenson Locomotive Society, Mr. Hanks paid tribute to the achievements of the steam locomotive, now about to pass from the railway scene after more than a century of service, and to the keenness of the large body of enthusiasts whose specialised interest it is. He disclosed that the record-breaking Great Western locomotive *City of Truro* is to return from York Railway Museum to Swindon, to work special trains run for enthusiasts. The response to the toast was given by the Chairman. The toast of "Our Guests"

was proposed by Mr. Patrick J. Garland, Chairman of the Midland Area of the Stephenson Locomotive Society; Mr. Cyril Smith, Chairman of the Railway Correspondence & Travel Society, responded.

**Institution of Locomotive Engineers Informal Film Evening.**—Three films were shown at an informal meeting on January 3, organised by the Institution of Locomotive Engineers. These were: "Valenciennes—Thionville"; "Harvesting of Peat"; and "Way to the West." The first deals with the electrification of the line between the two towns named, in N.E. France by the French National Railways on the 25-kV. overhead system; this project was described in our issue of October 29, 1954. The methods of tackling the various problems of electrification afford interesting comparison with those which are envisaged for industrial frequency conversion schemes in this country. The second film, in colour, describes the means by which peat bogs are being worked mechanically to yield granulated peat, either for subsequent processing into briquettes for domestic consumption or for use in small power stations built nearby. The last film, also in colour, admirably relates the story of the construction of the extension of the East African Railways & Harbours railway from Kampala to Kasese.

## Forthcoming Meetings

Open currently and until further notice.—British Transport Commission: Historical Exhibition "Transport Treasures" in Shareholders' Meeting Room, Euston Station, from 10 a.m. to 6 p.m. on weekdays, and 2 to 6 p.m. on Sundays. Admission 6d.

January 14 (Mon.).—Institute of Transport, at the Jarvis Hall (R.I.B.A.), 66, Portland Place, London, W.1., at 5.45 p.m. Paper on "Some problems and practices of the parcels carrier," by Mr. R. L. H. Farmer.

January 14 (Mon.).—British Railways All-Line Arts & Crafts Exhibition. At Brunswick House, Wandsworth Road, Vauxhall, at 3 p.m. Presentation of awards to winning exhibitors by Lady Robertson.

January 15 (Tue.).—Railway Correspondence & Travel Society, East Midlands Branch, at the N.C.S. Guild Room, Toll Street, Nottingham, at 7.30 p.m. Illustrated paper on "North East London branches and the Isle of Wight, 1956," by Mr. J. R. Bousier.

January 15 (Tue.).—Institution of Mechanical Engineers, at 1, Birdcage Walk, Westminster, S.W.1, at 6.45 p.m. Internal Combustion Engine Group discussion "Is there a future for the diesel engine in combination with the gas turbine?"

January 15 (Tue.).—Institute of Transport, Birmingham Graduate & Student Society at the Exchange & Engineering Centre, at 6.45 p.m. Paper on "Technical description and details of diesel trains," by Mr. D. C. Davies, British Railways.

January 15 (Tue.).—Institute of Transport, Essex Group, at the Shire Hall, Chelmsford, at 6.30 for 7 p.m. Paper on "Railway Electrification," by Mr. J. W. Dedman.

January 15 (Tue.).—Institute of Transport, North Western Section, at the Grand Hotel, Manchester, at 6.30 for 7 p.m. Annual dinner and visit of President.

January 16 (Wed.).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, London, W.C.2, at 6.15 p.m. Paper on "The oil industry in relation to transport," illustrated by films, by Mr. A. G. Taylor, Manager, Inland Distribution Department, Esso Petroleum Co. Ltd.

January 16 (Wed.).—Institution of Railway Signal Engineers, London Section, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, at 6 p.m. Paper on "Communications as applied to railways," by Mr. D. M. Clarke.

January 17 (Thu.).—Institute of Transport, Liverpool Graduate & Student Society, at the Corporation Transport Offices at 7 p.m. Paper on "Handling of railway traffic through marshalling yards," by Mr. C. R. Bennett.

January 17 (Thu.).—Stephenson Locomotive Society, at Caxton Hall, Westminster, S.W.1., at 6.45 p.m. Mr. H. Holcroft, formerly Assistant Chief Mechanical Engineer, S.R., will describe "Experiments with S.R. 2-6-0 engine A816."

January 17 (Thu.).—Diesel Engineers & Users Association, at the Caxton Hall, Westminster, London, S.W.1, at 2.30 p.m. Paper on "The world supplies of oil," by Mr. M. E. Hubbard.

January 17 (Thu.).—Model Railway Club, at Caxton Hall, Westminster, London, S.W.1, at 7.45 p.m. Talk on "The L.N.W.R.," by Mr. G. H. Platt.

January 22 (Tue.).—Institute of Transport, Leeds & District Graduate & Student Society, at the Leeds City Transport Department, 1, Swinigate, at 7 p.m. Paper on "Some ideas on the future rail traffic pattern in the North Eastern Region," by Mr. F. L. Hick.

January 22 (Tue.).—Institute of Transport, Metropolitan Graduate & Student Society, at 80, Portland Place, London, W.1., at 5.45 to 6.15 p.m. Paper on "Transport in the planned economy—the post-war experiment in Poland," by Mr. B. Brodzinski.

January 22 (Tue.).—Stephenson Locomotive Society, Midlands area, at 64, Holyhead Road, Coventry, at 7.30 p.m. Lantern slide miscellany, by Mr. F. M. Carrier.

January 23 (Wed.).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1., at 5.30 p.m. Paper on "Diesel locomotive building and maintenance," by Mr. T. F. B. Simpson.

January 25 (Fri.).—Institution of Railway Signal Engineers, Bristol Section, in the Meeting Room above Main Booking Hall, Temple Meads Station, at 5.30 p.m. Paper on "Automatic train control," by Mr. J. H. Currey.

January 26 (Sat.).—Permanent Way Institution. Conversation at 222, Marylebone Road, London, N.W.1., at 5.30 for 6 p.m.

January 26 (Sat.).—Railway Correspondence & Travel Society, Sussex & Kent Branch, at the Railway Hotel, Brighton, at 7 p.m. Paper on "Control on the Southern Region," by Mr. B. J. Holden. Also film show.

January 26 (Sat.).—Stephenson Locomotive Society, Liverpool Centre, in the Conference Room, Central Station, at 7.30 p.m. Paper on "A signalman's viewpoint," by Mr. Norman Marlow.

February 1 (Fri.).—Permanent Way In-

stitution, Manchester & Liverpool Section, in the Everton Room, Exchange Hotel, Liverpool, at 7 p.m. Talk on "Relaying problems affecting signal engineers and permanent way engineers' departments," by Mr. F. W. Young. Combined meeting with the Signal & Telegraph Society, Liverpool Branch.

## OFFICIAL NOTICES

**PRODUCTION ENGINEER** required for old-established Railway Rolling Stock Manufacturers. Experience of railway practice desirable, but not essential. Full details of past experience, together with age and salary, required. Box No. 207, *Railway Gazette*, 33, Tothill Street, London, S.W.1.

**MECHANICAL ENGINEER** of good education seeks position on British Railways or with well-known firm of Locomotive Builders. 47 years of age (married), 12 years' executive positions on Railways abroad. Steam, Diesel, Carriage and Wagon experience. Not afraid of hard work and long hours. All replies answered. Box 218, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

**SENIOR DRAUGHTSMEN**, with good hydraulic or mechanical experience, are required by the Dowty Companies at Ashchurch, Glos., on a number of interesting industrial hydraulic projects. Pleasant area. Excellent working conditions, with lodging allowance. Assistance with house purchase and removal expenses in approved cases. Attractive salaries for the right man.—Apply, giving full details, to Personnel Manager, Dowty Hydraulic Units, Ltd., Ashchurch, Glos.

**LONDON TRANSPORT require ENGINEERING ASSISTANT** to inspect ferrous and non-ferrous materials delivered for immediate use or after processing, and to inspect newly delivered or manufactured equipment. Qualifications: basic knowledge of civil or mechanical engineering; familiarity with materials and equipment used on this type of work; familiarity with use of gauges and measuring instruments employed in checking dimensions. Higher National Certificate in mechanical engineering desirable. Salary range £870—£900 p.a. Free travel; contributory superannuation scheme after probation. Applications within 14 days to Recruitment & Training Officer (F/EV 619), London Transport, 55, Broadway, S.W.1.

**MIDDLESEX COUNTY COUNCIL—COUNTY ARCHITECT'S DEPT.—HEATING ENGINEERING ASSISTANTS** required for preparation of schemes for heating and hot water installation in grades: A.P.T. II, £609 17s. 6d.—£691 17s. 6d., plus £45 Westminster weighting; A.P.T. III, £656—£784 2s. 6d., plus £35 Westminster weighting. London weighting additional, £30 for age 26 and over, £20 for 21–25, £10 under 21 years. Prescribed conditions. Commencing salary according to qualifications and experience. Application forms from County Architect (stamped addressed foolscap envelope), 1, Queen Anne's Gate Buildings, Dartmouth Street, S.W.1, returnable by 21st January. (Quote U.317 R.G.) Canvassing disqualifies.

**DIESEL TRACTION ENGINEER** required by Mining Company in West Africa, to assume charge of maintenance, running and repair of diesel electric locomotives, stock shunting and work on privately-owned Railway. Applicants should state concisely experience with traction diesels and associated electrical gear in diesel electric locomotives. State full details engineering qualifications. Salary according to experience and qualifications. Tours approximately 15 months, with liberal leave in U.K. on full salary. Return passage paid. Initial kit allowance, free furnished quarters, and medical attention. Contributory Pension Scheme. Life Assurance and Dependents' Income Scheme. Write, with copies references, stating age, married or single, to Sierra Leone Development Co., Ltd., Dept. E1, City-Gate House, Finsbury Square, E.C.2.

**ASSISTANT WORKS MANAGER**, Gold Coast Railway. To assist the Works Manager in responsibility for maintaining heavy workshop repairs to locomotives, cranes, auxiliary plant and other mechanical equipment. Contract appointment for two tours of 18–24 months. Salary range £1,030—£2,020, plus £29 15s. p.a. temporary addition. Commencing salary depending on experience. Gratuity of £12 10s. for each month of satisfactory service. Free passages for officer, wife, and up to three children under 13 years. Quarters, if available, at rental £60—£90 p.a. Generous leave. Candidates should be not less than 23 years of age and hold a University Degree in Mechanical Engineering, or should have passed or be exempt from Parts I and II of the examination for A.M.I.Mech.E., and have at least two years' post qualification experience. Preference will be given to candidates with at least 3 years' administrative experience. Write Director of Recruitment, Colonial Office, London, S.W.1, giving age, qualifications and experience, quoting BCD.110/13/022.

**REQUIRED** for the Central Railway of Peru: (i) **TEMPORARY OFFICER**, Stores Vocabulary. Approximately two years. Knowledge of Spanish and Railways to compile a new Stores Vocabulary.

Retired Engineer or Draughtsman will be suitable. Salary £1,600 per annum, plus cost-of-living allowance of 20 per cent. (ii) **ASSISTANT ENGINEER**, Engineering graduate or young civil Engineer, with Railway experience in a District Engineer's Office. Age 24–30 years. Must be physically fit and able to work at heights. Salary £1,300—£1,500 per annum, according to experience, plus cost-of-living allowance of 20 per cent. (iii) **ASSISTANT MECHANICAL ENGINEER**, Graduate of the Institute of Mechanical Engineers. Must have served apprenticeship with British Railways, Steam or Diesel Locomotive Manufacturers. Age 23–30 years, and fit to work at altitudes of 15–16,000 ft. Salary £1,200—£1,350 per annum, according to experience, plus cost-of-living allowance of 20 per cent. Required for the Southern Railway of Peru: **ASSISTANT ENGINEER**, Engineering graduate or young civil Engineer with experience in the maintenance of track and buildings. Age 24–30 years. Salary £1,300 to £1,500 per annum, according to experience, plus cost-of-living allowance of 20 per cent. Apply in writings: Peruvian Transport Purchasing Co., Ltd., "Rex House," 38, King William Street, London, E.C.4.

**MALAYAN RAILWAY ADMINISTRATION.** Applications are invited from Civil Engineers for employment as Resident Engineers with the Malayan Railway Administration. Appointments will be on 3-year contract.

**SENIOR RESIDENT ENGINEER.** Applicants must be Chartered Civil Engineers, who have had at least 10 years' professional experience in heavy engineering, preferably on port construction. Salary £1,360 per month, plus cost-of-living allowance at current rates (at present no cost-of-living allowance is payable to bachelors drawing this salary; for married men the cost-of-living allowance is \$155 per month, and for married men with children \$230 per month), plus gratuity at the rate of £81 for each completed period of three months' service payable on the satisfactory completion of the contract. Gratuities are subject to Malayan Income Tax.

**RESIDENT ENGINEERS.** Applicants must be Chartered Civil Engineers, or hold a degree in Civil Engineering which is recognised as exempting from Parts I and II of the A.M.I.C.E. Examination and have had at least two years' professional experience. Salary will be within the limits of \$628 and \$1,254 per month, in accordance with age, professional experience and qualifications. Cost-of-living allowance on current rates will also be payable, plus gratuity at the rate of £58 for those drawing a salary up to \$934 per month, and £81 for those drawing a salary above \$934 for each completed period of three months' service payable on the satisfactory completion of the contract. Gratuities are subject to Malayan Income Tax. The Government rate of exchange is at present 2s. 4d. to the dollar.

Vacancies exist for employment on construction and/or design of new port works, and candidates should state the type of work they prefer. Quarters will be provided at a nominal rental or housing allowance may be paid in lieu. Free passages to Malaya on appointment and termination of contract are granted. An outfit allowance of £60 is payable on appointment, this advance being repayable in one year. Applications, stating age, qualifications and experience, should be addressed to the General Manager, Malayan Railway, P.O. Box No. 1, Kuala Lumpur, Malaya. The closing date for applications is 31st January, 1957.

## Railway Stock Market

Stock markets continued their upward trend under the lead of British Funds, which responded strongly to growing talk that the Bank rate may be reduced shortly from 5½ per cent to 5 per cent, and that later in the year it may be cut to 4 per cent. It is realised that the question of a lower Bank rate must depend on many factors, in particular whether inflation can be held in check. The view seems to be gaining ground that the existing credit squeeze by the banks is all that is necessary. In fact, the City will be surprised if the Bank rate is not reduced before long. The rise in British Funds has influenced a strong upward trend in other sections of stock markets. The advance in industrial shares does not indicate hopes of higher dividends, but is largely a reflection of the general trend in markets. It is clear that profits in many industries are now running at lower levels because of increased costs which have been accentuated by the sharp advance in oil and petrol prices.

Canadian Pacifics have come back to \$64xd, compared with \$64½ a week ago, sentiment having been affected by the strike. The 4 per cent preference stock declined on balance from £57 to £58½,

but the 4 per cent debentures gained a point at £66½. Elsewhere, White Pass shares have receded from \$20½ a week ago to \$20½.

Midland Railway of Western Australia stock has changed hands at 8; while in other directions, Nyasaland Railways shares strengthened to 8s. 6d. and the 3½ per cent debentures were 57.

Buyers have been about for Antofagasta ordinary stock, which has risen from 31½ a week ago to 32½, while the preference stock was fractionally higher at 46, and the 5 per cent Bolivar debentures 91½. United of Havana second income stock was 74, and the consolidated stock 2½, both ex the distributions. Nitrate Rails shares were 20s. and Taltal shares 12s. Brazil Railway bonds kept at 6, and San Paulo Railway 3s. units were 3s. 3d. Dorada ordinary stock and debentures were quoted at 50½ and 107½.

Elsewhere, Guayaquil & Quito assented bonds were 73. Costa Rica ordinary stock was 24 and the first debentures 74½. Mexican Central "A" debentures strengthened to 72. International of Central America common shares were again quoted at \$34½. In other directions, Peru Transport shares were firmer at 51½. United of Yucatan 5 per cent bonds have marked 14½.

There was slightly more business reported in shares of locomotive builders and engineers but after rising to 35s., Beyer Peacock eased to 34s. 6d., which, however, compares with 34s. a week ago. Charles Roberts 5s. shares were 10s. 7½d., the same as a week ago, while Hurst Nelson have remained at 38s. North British Locomotive eased from 11s. 4½d. to 11s. but Birmingham Carriage moved from 14s. 3d. to 15s. 6d. Gloucester wagon 10s. shares gained 1s. at 12s. 3d. and Wagon Repairs 5s. shares were firm at 11s. 4½d.

Westinghouse Brake shares, after rising to 75s. 6d., came back to 74s., which, however, compares with 72s. a week ago. The unchanged 18 per cent dividend came as a disappointment, although the higher profits created an excellent impression. Nearly 50 per cent was earned on the shares.

Moderate gains were achieved in Associated Electrical at 67s.; General Electric at 52s. 3d. were also good, and English Electric at 48s. 6d. have been well maintained. Vickers showed a moderate reaction at 42s. 3d. after an earlier advance, and many other shares have not held best levels. Imperial Chemical were 39s. 7½d. helped by the huge success of the £40,000,000 issue of 5½ per cent loan stock. Applications totalled nearly £240,000,000 which, of course, made inevitable a scaling down of allotments. Issue price was £96 and there are expectations of a premium of up to £3 when dealings start. The big success of this issue, which was confined to the company's shareholders, is explained by the fact that the stock has future rights of conversion into ordinary shares. Shareholders in the company include leading insurance and investment companies to whom a stock of this kind is particularly attractive. At the issue price there is a yield of not far short of 5½ per cent.

There has been a further easing of prices of steel shares, partly because of disappointment with the absence of increased dividends. It is recognised that resources must be conserved because of the huge sums that have to be spent on new plant and equipment. Nevertheless, at current prices steel shares offer generous yields, which are bound to attract buyers if buoyant conditions continue in markets.

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